Evaluating a Multimodal Intervention for Hong Kong's Older Informal and Precarious Workers

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Abstract

Purpose: This article evaluates the Pickers' Link, a Hong Kong initiative enhancing older waste pickers' bio-psycho-social well-being, addressing research and practice gaps for precarious workers.

Methods: The study employed a mixed-methods approach, using qualitative analysis to assess program influences in 30 participants, and quantitative measures to evaluate changes in pain, cognition, and physical performance in 28 participants pre- and post-treatment.

Results: The program's influence and mechanisms were captured in themes spanning social and digital engagement, health and mobility benefits, crucial outreach engagement and personalized support. The quantitative analysis revealed pain reduction and cognitive enhancements post-treatment, while improvements in grip strength and physical function did not meet clinical significance thresholds.

Discussion: Practice for older informal and precarious workers should prioritize outreach, bio-psycho-social health, diverse interactions, and flexible programming. This study presents an innovative approach to evaluating community initiatives and underscores the value of interdisciplinary efforts in social work practice and research.

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By 2030, the number of older workers (55-64 years) will comprise a quarter of the global labor force (International Labour Organization, 2020). In the last decade in OECD countries, the participation of older workers increased, on average, from 33% to 55% (Mojon & Ragot, 2019). The global workforce is ageing and there is an increasing trend of older people working past the traditional retirement age (Cahill et al., 2015). Ageing populations, low fertility, and increased longevity, alongside reduced pensions, rising living costs, and a knowledge economy valuing experience, contribute to the trend of working past 65.

Extending the Work Life: Good for Some; Not for Others?

In 2020, the WHO and UN launched the UN Decade of Healthy Ageing (2021-2030), a 10-year initiative to enhance the well-being of older adults, their families, and communities (WHO & UN, 2023). Work has been found to contribute to healthy ageing in late life (Crawford, 2019). This research has been used to support the promotion of extending the working life and growing trends in raising the statutory retirement age (of when one is eligible to receive old age benefits) (OECD, 2002). However, the type of employment matters when considering the healthy ageing outcomes of work life extension. Baxter and colleagues (2021) found in their systematic review of "health outcomes resulting from extended working lives" that positive benefits were more likely to be reported by "males, those working part-time or reducing to part-time, and employees in jobs which are not low quality or low-reward" (p. 1). However, their review focused on the formal work sector. Their findings may not be generalized to older people occupying precarious work in the informal sector, who may face ever further challenges. Precarious and informal work are related yet distinct categories. Informal work is defined by the absence of formal contracts and social security

benefits, while precarious work, present in both sectors, is marked by poor conditions, including low pay, greater job hazards, instability, and limited rights (Benavides et al., 2022). Notably, older individuals involved in both precarious and informal employment face amplified difficulties.

Research, policies, and programs focused on supporting older informal workers, particularly in precarious jobs marked by regulatory gaps, low pay, instability, and limited worker autonomy, are limited (Campbell & Price, 2016). Estimating the percentage of older people in precarious and informal jobs is difficult, as estimations of the entire informal sector is challenging (IMF, 2021). Yet, the IMF (2021) suggests about 2 billion or 60% of the global workforce is in the informal sector, with 85% in precarious jobs often due to limited formal opportunities. It is likely a large proportion of informal workers occupying precarious positions are older, as population ageing is occurring across all sectors of society.

Limited data exists on informal and precarious work in Hong Kong as well; however, Li's (2019) study utilizing the 2011-2012 Hong Kong Panel Study of Social Dynamics, while outdated, can offer some insights. It shows an 18.3% rate of precarious employment, escalating with age to 25.2% for those over 50 and 29.44% for the 60+ demographic, while younger age groups experience lower rates: 15.52% for under-30s, 11.96% for those in their 30s, and 17.82% for individuals in their 40s. Precarious employment in this study includes self-employment, part-time, or short-term/casual work.

Consequences of Informal and Precarious Work in Late life

Research on older adults in precarious informal employment is scarce, but studies comparing health outcomes of informal versus formal workers and those of older adults in low-quality formal jobs offer insights into the impacts of late-life informal precarious work. Naicker and colleagues (2021) conducted a systematic review and meta-analysis to examine

health differences between those working in the formal vs. informal sector (not age specific). Their study involved 1.6 million participants from seven countries across Africa, Americas, Eastern Mediterranean, and Western Pacific, revealing that informal workers use health services less and have higher depression rates. Further, at a macro-level, research shows a positive correlation between a country's informal job proportion and years lost to disability and premature mortality (Muntaner et al., 2010).

Numerous studies have examined the physical health effects of high-strain, low-reward jobs (e.g., janitorial, and fast-food workers) on older workers in the formal sector. Kalousova and Mendes de Leon (2015) used SHARE I (2004) and SHARE IV (2010/2011) data (N = 2475) to show significant links between high effort-low reward/control ratios and increasing frailty in Europe. Retirement moderated frailty effects, but non-retirees in low-reward jobs saw the greatest frailty increases at follow-up. It is also well established in the literature that higher job strain is associated with the prevalence of cardiovascular diseases (Kivimäki et al., 2012).

Initiatives to Help Informal and Precarious Older Workers

Gunn et al. (2022) conducted a systematic literature review, examining initiatives for precarious employment and its health and wellbeing impacts. In their definition of precarious employment, they incorporated informal work, acknowledging its unique status yet similar issues with job security, income levels, and workers' rights. Despite scanning 8000 records, they only found 11 initiatives. Only one initiative was specifically crafted to tackle precarious employment, focusing on employment protection laws for permanent staff and curbing the use of temporary contracts. The other 10 initiatives, such as tax policies and international quality standards, were not intended for precarious work issues but were considered for their possible effects on workers' precarious employment conditions and family well-being.

Gunn et al. (2022) found extensive documentation on employment conditions and their health impacts on precarious workers but identified a significant gap in research on initiatives to address precarious employment and enhance worker health. The review encompassed adults 18 and older but lacked age-specific data, indicating a broader scarcity of measures for precarious and informal workers, particularly for the elderly. Additionally, while China featured in the research, no specific initiatives were discovered in Hong Kong.

"The Cardboard Grannies of Hong Kong": An Underserved Group of Older Informal and Precarious Workers in Hong Kong

Despite Hong Kong's advanced waste management system, informal waste picking remains, with an estimated 2,900 individuals, mainly older women, known locally as the Cardboard Grannies (Waste Pickers Platform, 2018). A 2018 survey by the Waste Pickers Platform of 505 recyclers found that the majority were over 60 earning an average of HK$716 (~USD 91) monthly from recycling. As reference, 1 kilogram of cardboard is worth HKD0.7 (~USD0.09). To make minimum wage which is HKD40/hour (~USD5.12), about 57 kg must be collected per hour. A 2022 qualitative study (Kwan & Tam, 2022) highlighted their struggles, including public discrimination, conflicts with authorities, family stigma, and amplified hardships during COVID-19. Social work and services in Hong Kong have yet to specifically address the needs of this subgroup of informal and precarious workers, with social work involvement primarily limited to advocacy through the Waste Pickers Platform at a macro level.

Study Aims

The aging workforce brings occupational gerontology to the fore, analyzing work's impact on aging. Significant gaps in knowledge and policy persist for older, informal workers in precarious employment, with gerontological social work essential to address these issues,

yet research-based literature is scarce (Gunn et al., 2022). This article delivers a distinctive contribution to social work through its evaluation of the Pickers' Link, a novel Hong Kong program co-developed by social work and rehabilitation sciences, aimed at improving the bio-psycho-social well-being of older (65+) waste pickers. Its mixed-methods evaluation not only informs local program refinement but also provides a rare, research-based example of the biopsychosocial (BPS) model in action, a model often discussed but seldom demonstrated in social work literature (Maynard et al., 2018). This interdisciplinary collaboration and its empirical insights mark a novel addition to global practices for supporting older workers in informal and precarious employment. This study was guided by the research question: In what ways does participation in the Pickers' Link program influence the physical, psychological, and social dimensions of well-being among older waste pickers, and what are the underlying mechanisms, as revealed by quantitative health outcomes and qualitative personal narratives.

Method

Research Design

This study was approved by the Human Subjects Ethics Committee at the Hong Kong Polytechnic University (Reference Number: HSEARS20210806005). Informed written consent was obtained with all participants of the study. In assessing the influence and mechanisms of the Pickers' Link, the study utilized a mixed-methods convergent parallel design (QUAL. + quant.), where qualitative and quantitative data were collected simultaneously and analyzed independently before being merged to draw comprehensive conclusions (Creswell & Creswell, 2023). Our emphasis was primarily on qualitative methods such as in-depth interviews and focus group discussions (FGDs). This decision was informed by principles of utilization-focused evaluation (Patton, 2008).

The Pickers' Link, a two-year complex community intervention in HK, was a pioneer venture where local staff and a leading NGO charted new territory. They adapted the program to meet evolving needs, integrating, and refining interventions throughout the two years —an experimental design could have restricted this adaptability (Patton, 2008). Patton's utilization-focused evaluation, highlighting qualitative methods used at various points, "opened the black box," providing insights into the program's influence, mechanisms, and real-time feedback. Qualitative data collection shed light on both anticipated and unexpected perceptions, unmet service needs, and a spectrum of influences from the Pickers' Link.

Participants

Overall, the study recruited 42 out of 93 Pickers' Link members, with an overlap where 12 participants provided data for both the qualitative and quantitative components. Table 1 outlines the demographic profile of the qualitative and quantitative study samples.

Qualitative Sample

Qualitative participants were recruited by the social work research team during NGO-led outreach and group activities, where research team members scheduled interviews and FGDs for a later date. Using convenience and maximum variation sampling (Creswell & Creswell, 2023), 30 Pickers' Link members were recruited between April and November 2022.

Quantitative Sample

Convenience sampling was used to recruit 28 participants for the quantitative sample. NGO personnel disseminated study details, including time and location, during all events two weeks prior to the baseline assessments, which took place between July and December 2022. Subsequently, interested individuals provided contact information for the rehabilitation sciences research team to follow-up.

Intervention

The Pickers' Link is a collaborative healthy aging intervention designed by gerontological social workers, a design institute project manager, and a clinician-scientist from Rehabilitation Sciences, who also participated in the evaluation. This program incorporates the WHO's (2023) healthy aging concept, emphasizing physical and psycho-social health in aging, along with the person-in-environment (PiE) approach that considers individual context and both personal and environmental factors in interventions (Green & McDermott, 2010).

The Pickers' link included a diverse and multiple set of activities across two years running from July 2021 to June 2023. The Pickers' Link targets the macro level by raising public awareness and advocating for waste-picking-friendly environment, the mezzo level by providing community-based support network and resources for the older pickers, and the micro level by offering individualized care (including improving the design of the trolleys used by the older pickers to transport their goods), physiotherapy, occupational therapy, and group leisure activities (e.g., group activities and outings, and smartphone classes) to enhance their well-being.

All physiotherapy and occupational therapy interventions were provided at one of the community centers involved in the region. An experienced physiotherapist with over 5 years of experience provided four 1-hour weekly sessions of tailored physiotherapy to the participants based on baseline assessments and individual treatment responses. Treatment modalities included manual therapy, resistance exercises with resistance bands, conditioning exercises, and transcutaneous electrical nerve stimulation. The physiotherapist also provided education on self-management of pain.

The occupational therapist, with 10 years of experience, provided structured training through four 1-hour weekly sessions. The training included an introduction to manual handling, selection, and correct usage of a trolley for carrying cardboards, occupational safety, road safety, introduction to mindfulness exercises, relaxation, and breathing exercises. Due to limited time resources, the occupational therapist only introduced the principles of cognitive training and made suggestions regarding those trainings.

The two-year program engaged 93 older waste pickers, providing resources, services, empowerment via volunteering, and skill-building tailored to individual needs. Besides the participants, the program involved various stakeholders, such as private businesses (e.g., Pandamart and Gucci), NGOs, government bodies, over 20 schools, and 13 local establishments (e.g., restaurants and recycling depots), throughout its execution. The program also launched a one-year volunteer initiative with 28 young adults trained in informal recycling, old age welfare in HK, and communication to support regular visits to older pickers. The NGO developed and led the outreach activities (3-hour sessions), educational programs including school visits, exhibitions, and workshops (4-hour sessions), group activities (1-2 hour sessions), volunteer opportunities (3-hour sessions), and occupational safety workshops (1-hour sessions). The Jockey Club Design Institute for Social Innovation managed the trolley distribution and maintenance activities (30-minute sessions). The collaboration with these various stakeholders aimed to harness resources and establish a multi-sectoral platform for the healthy aging of this group. Figure 1 lists the 308 types of activities conducted over two years, detailing their occurrence rates and proportions in the program.

Measures and Instruments

Qualitative Instruments

Semi-structured Interviews and Focus Group Discussions. The semi-structured interview guide, which probed significant personal changes, helpful resources, and major challenges since joining the Picker's Link, was utilized for both individual interviews and FGDs. It was developed by the social work research team and piloted with three individual participants. The only modifications made were to simplify the language, enhance question clarity, and reinforce the confidentiality and independence of the research team from the NGO to ensure more accurate accounts of their experiences.

Quantitative Measures

Numeric Pain Rating Scale (NPRS). To assess pain intensity, we employed the Numeric Pain Rating Scale (NPRS), where 0 is no pain and 10 is the worst pain (Salaffi et al., 2004). The NPRS was chosen because it demonstrated excellent reliability, with an intra-class correlation coefficient (ICC) above 0.92 among Chinese older adults (Li et al., 2009). It also showed good construct validity compared to other pain scales, such as the Verbal Descriptor Scale, Visual Analog Scale, and Faces Pain Scale Revised, with Spearman correlations ranging from 0.74 to 0.95 (Li et al., 2007). Additionally, it was preferred by Chinese older adults with different levels of cognitive function (Liu & Li, 2004). An overall NPRS score after considering all painful sites was calculated for data analysis.

Hong Kong Version of the Montreal Cognitive Assessment (HK-MoCA). The Hong Kong version of the Montreal Cognitive Assessment (HK-MoCA) was used to identify older adults with mild cognitive impairment or dementia, with corresponding cut-off scores of 22 and 19, respectively (Yeung et al., 2014). The sensitivity and specificity for detecting mild cognitive impairment were 0.828 and 0.735, respectively, while the sensitivity and specificity for detecting dementia were 0.923 and 0.918, respectively. The inter-rater reliability of HK-MoCA was 0.987. HK-MoCA also demonstrated excellent concurrent

validity with the Cantonese version of Mini-Mental State Examination, with a Pearson correlation coefficient of 0.894.

Physical Performance Assessments. The physical assessments included the 40-meter fast-paced walk test (40mFPWT) (Wright et al., 2011), the 6-minute walk test (6MWT) (Simonsick et al., 2001), and the 30s chair stand test (30sCST) (Özkeskin et al., 2022) to evaluate walking speed, walking distance (endurance), and lower limb strength, respectively. These performance-based tests were recommended by the Osteoarthritis Research Society International for evaluating physical function in individuals with hip and knee osteoarthritis, which are common among older adults (Dobson et al., 2017). In particular, the within session inter-rater reliability of 40mFPWT, 6MWT, and 30sCST was reported as ICCs = 0.96, 0.94, and 0.86, respectively (Dobson et al., 2017). The ICCs for the between-day intra-rater reliability of 40mFPWT, 6MWT, and 30sCST were 0.92, 0.93, and 0.85, respectively (Dobson et al., 2017). During the 40mFPWT, participants were required to walk 40 meters at their fastest speed, while their time was recorded. The 6MWT involved the participant covering the greatest distance possible within a 6-minute period. The 30sCST required participants to stand up from a chair as many times as possible within 30 seconds. All assessments were conducted at baseline and immediately after the interventions.

Data Collection and Analysis Procedures

Qualitative Data Collection and Analysis

The data encompassed 18 in-depth interviews involving 19 participants, including one joint session with a married couple. Additionally, three FGDs were held with a combined total of 11 participants—two groups had four participants each, and one group had three. Both the interviews and FGDs ranged from 45 to 60 minutes in duration. Interviews took

place in participants' work communities, while FGDs occurred at the program centre. The third author, a member of the social work research team conducted all interviews and FGDs.

The sessions, held in Cantonese, were audio recorded, and then translated into English for analysis, and during this process all identifying information was removed. The same team member that carried out the interviews also did the transcriptions verbatim. Albeit, to ensure transcription accuracy while acknowledging the limitations of cross-language equivalence, where direct translation is not possible for certain terms, idioms, and proverbs (Temple, 2002), the transcriber was instructed to retain the original language and provide an English explanation in brackets. The transcriber also added notes in brackets to clarify things that might not be clear from the text alone, such as long pauses. These notes helped to highlight the transcriber's own comments separate from the participants' words, but also help to provide accuracy in the transcription process.

Thematic Analysis (TA) (Clarke & Braun, 2017) was used to analyse the qualitative data, which involved reading the English transcripts sentence-by-sentence and coding for relevancy and meaning. The qualitative research analyst (first author) read each sentence and coded based on relevance to the Pickers' Link influences and mechanisms. A constant comparison method was used for coding, which means that as the analyst continues to code, they also sort and organize (constantly compare) the codes to identify patterns across and relationships between the codes. These patterns and relationships become themes capturing the most relevant and significant insights about the research topic and questions (Saldaña, 2016). A hybrid coding approach was applied, informed by healthy aging and PIE frameworks for deductive codes, while inductive codes highlighted novel, culturally relevant findings.

Data from the individual interviews and FGDs were analyzed together because they were designed to complement each other (Lambert & Loiselle, 2008). Individual interviews facilitated the application of maximum variation sampling, ensuring a breadth of diverse perspectives, enabling a deep dive into distinctive, nuanced insights, and for data saturation. On the other hand, FGDs offered a pragmatic, resource-efficient approach by engaging multiple participants at once. Critically, they fostered a synergistic dialogue that revealed collective insights not typically accessible through individual interviews. By synthesizing these results, we aimed to present a comprehensive view that captures both the individual and collective experiences of the participants.

Data analysis was conducted iteratively alongside data collection to determine when data saturation was reached. Data saturation is defined as the point at which new data (interviews) yield little or no additional relevant information in relation to the study objectives (Guest et al., 2020). The primary analyst, the first author, determined that data saturation was achieved after conducting 3 FGDs and 18 individual interviews. This finding was corroborated by the third author, who carried out all the FGDs and interviews and confirmed during regular peer-debriefing sessions (McMahon & Winch, 2018)—held after every 3 to 5 interviews—that no new or novel information was emerging. Qualitative data were analyzed using NVivo 14.

Quantitative Data Collection and Analysis

The quantitative study aimed to evaluate the effect of physiotherapy and occupational therapy on the pain and physical performance of the Picker's Link members. Two hypotheses were tested:

Hypothesis 1: There was a significant pain reduction following the interventions.

Hypothesis 2: There were significant post-treatment improvements in the grip strength, 40mFPWT, 6MWT, and the number of repetitions for the 30sCST.

The second author collected and analysed the quantitative data, with baseline measures taken between July and December 2022 and post-intervention follow-up from December 2022 to March 2023. Participants completed questionnaires at baseline on their symptoms and underwent physical function assessments, lasting 40-50 minutes. Pain locations were recorded on a body diagram, and average pain intensity was rated using the NPRS.

After baseline assessments, participants underwent 4 occupational therapy sessions and 4 physiotherapy sessions over 2-4 months, varying by availability, followed by immediate post-intervention assessments. A total of 28 members completed the baseline and post-treatment assessments. The data was analysed by using IBM SPSS Statistics (Version 29). Specifically, descriptive analysis was conducted using mean and standard deviation, or frequency depending on the nature of data. Pre- and post-treatment differences were analysed using paired t-test or Wilcoxon test for parametric and non-parametric data, respectively. Cohen's *d* was used to interpret the effect size, where 0.2, 0.5, and 0.8 indicate small, medium, and large effect size (Lakens, 2013).

Mixed Methods Analysis

The qualitative component allowed participants to freely share experiences related to influences and mechanisms of the program, while the quantitative aspect evaluated physical well-being through tailored physiotherapy and occupational therapy interventions with specific metrics. Consistent with the parallel convergent mixed-methods design (Creswell, & Creswell, 2023), data from the qualitative and quantitative methods are first presented independently, reflecting their separate collection and analysis, and subsequently integrated in the discussion for a synthesized understanding of the findings.

Results

Quantitative Results

The baseline mean HK-MoCA score suggested participants had signs of cognitive decline (see Table 2). The participants' mean baseline NPRS scores showed moderate pain, mostly in the lower back (85.7%), knees (64.3%), and shoulders (50.0%), with 57.1% having multiple painful sites. Their baseline grip strength aligned with normative data for Chinese older adults (He et al., 2023). Participants, at baseline, underperformed in the 30sCST compared to Asian age-matched individuals (10.9 vs. 13.7 repetitions, Yee et al., 2021) and had slower 40mFPWT speeds (1.1 $\pm$ 0.3 m/s) than age-matched females (1.8 $\pm$ 0.3m/s) and males (2.1 $\pm$ 0.4m/s) (Dobson et al., 2017). The 6MWT distance (340.6 $\pm$ 97.1 m) fell below the norm for Asians aged 60-80 (519.0 $\pm$ 55.4 m) (Yeung et al., 2022).

Our findings supported Hypothesis 1, which stated that there would be a significant pain reduction following the interventions. Specifically, there was a significant post-treatment reduction in pain that surpassed the recommended minimal clinically important difference (MCID, 2 out of 10) (Salaffi et al., 2004) (see Table 2). The effect size was large, with Cohen's $d = 1.37$ (see Table 2). Interestingly, there was strong evidence of significant post-treatment improvement in the MoCA scores, with a medium effect size of Cohen's $d = 0.55$ (see Table 2). However, it is worth noting that this improvement was smaller than the repeated measurement error of 4 points (Feeney et al., 2016).

Our findings partly supported Hypothesis 2, which proposed significant post-treatment improvements in the grip strength, 40mFPWT speed, 6MWT distance, and number of repetitions during the 30sCST. In particular, the grip strength test showed weak evidence of reduced left hand grip strength, with a small effect size of Cohen's $d = 0.40$ (see Table 2). However, this reduction was smaller than the reported MCID of 5 kg (Bobos et al., 2020).

Likewise, there was a post-treatment increase in the mean number of repetitions during the 30sCST, with a medium effect size of Cohen's $d = 0.50$ (see Table 2). However, this increase was smaller than the respective MCID of 2.6 repetitions (Wright et al., 2011) (see Table 2). Conversely, both the 40mFPWT speed and 6MWT distance did not show significant increases after the treatment.

Qualitative Results

Theme: Enhanced Social Participation (n = 22, 73%)

Twenty-two out of the thirty participants explained that prior to engagement with the Pickers link, the primary activity they were doing was picking cardboards. One participant shared in the FGD, "We didn't have such activities to do before. We only could go waste-picking…how were we able to know to do these things, you know? We didn't know there are others activities to do with organizations like this" (Female, 66). When asked about ways to improve services and activities, participants also shared that nothing needed to be improved: "Enough for me – how can we request for more?" (Female, 68); "I think it is all good now. I am very satisfied now." (Female, 70); and "We can't ask for too much, you know? They already organised all these for us, we cannot demand more" (Female, 74).

Sub-theme: Opportunities to Travel and Sight See within Hong Kong (n =16, 53%). Fifty-three percent of the participants, long-term residents of Hong Kong, revealed they had not visited many local tourist spots until recently discovering opportunities for travel and sightseeing within the city through the program. One participant said, "I like it [sightseeing activities] very much! It is because I didn't have much chance to travel anywhere when I was young. I am very grateful that [Staff] takes us to day trips. When we were young we were busy -we only focused on working" (Female, 71). For one participant, who has progressive vision issues, the chance to travel and sight see within HK was particularly

important, “I still have not visited many places in Hong Kong . . .. If I have a chance, I would like to visit… before my eye turns blind” (Female, 63).

Sub-theme: Farming– Activities of Familiarity (n = 8, 27%). Eight of the thirty participants also discussed the activities related to farming. The participants explained how they enjoyed this activity because they use to engage in this activity when they were young. As this participant shared, “I like to do farming, I used to farm every day in the past” (Female, 73). Another participant explained her preference for this activity, “I love weeding because I don’t need to think… haha… I don’t like using my brain. I don’t have a brain. I don’t want to think too much” (Female, 70). Another participant shared this feeling, “Yes, I enjoy planting the most. Apart from the farming that we joined last year, we also planted some flowers in the [name] Centre. I only know how to farm. I don’t know what else I am good at” (Female, 76).

Theme: Home Visits for Dialogue, Intergenerational Exchange and Positive Affect (n = 24, 80%)

The activity most discussed by 80% of the participants was related to the home visits organized by the Pickers’ Link. One participant shared, “I am happy to talk with youngsters [from the volunteer group], if they are willing to talk with us. We can have a good conversation. If I can talk with others, I feel happy. You visit and talk with me, that is a kind of a help” (Male, 71). Some participants shared that without the home visits they would not have an opportunity to talk much with others “I like to chat with others… I am bored at home, only sitting and watching TV - so bored” (Female, 73). Another participant echoed this sentiment, “I do like talking to the young volunteers and other members, it is happier to have more people hanging and chatting together. It is less boring” (Female, 76).

Theme: Perceived Alleviation of Aches and Pains and Feelings of Relaxation from the Physiotherapy and Rehabilitation Activities (n = 23, 77%)

Another key activity discussed by 77% of the participants were the physiotherapy and rehabilitation activities. Participants discussed these activities as generally having a positive influence on their health and wellbeing. As this participant explained "I feel very comfortable after joining the physiotherapy sessions. It is better than me massaging myself. Even my children are not treating me that well, you know! The physiotherapist is very patient, and the physiotherapist is not afraid of us being dirty" (Female, 66). Another participant shared, "I sometimes suffer from back pain, at first I couldn't stretch my back, and now it has become more flexible by constantly stretching it. My back has become less painful. Mr. [Name] [the physiotherapist] taught me the moves, and told me to do it bit by bit" (Female, 71).

While the participants generally spoke positively about these activities, limitations were noted. One participant explained, "Now I know the proper moves to stretch… but you know it is another thing if I can remember when I return home. I have bad memory" (Female, 71). Another participant shared, "The physiotherapist massaged me a bit, it was so comfortable. Yes, but you never know if it helps, if you don't do it for long term. I don't have that time to stretch at home! You know, I just want to sleep when I arrive home. I am so tired every day" (Female, 66). For some, pain management views hindered the activity's influence, "You know, some chronic injuries can't be helped. I have many chronic injuries that cause ache sometimes. Those can't be healed" (Female, 71).

Theme: Enhanced Digital Access through Smart Phone Use Training (n = 11, 37%)

Another activity discussed by 37% of the participants relates to receiving a smartphone from the Pickers' Link and the trainings on its use. Participants shared how access to and training of using the smartphone was particularly useful during the social

restrictions of the pandemic: “They teach us… because now there is the LeaveHomeSafe app, and we need to have a different set up. I have joined but sometimes after they teach me, I forget. The workshop is where I learn. If I listen more, I will remember a little bit. We didn’t use this type of phone in the past. We used phones to call out and receive calls only. But now phones have many new functions” (Female, 63). Another participant shared how she also learned to use the smartphone for entertainment purposes “It is not bad because it can be a kind of entertainment for us. I know how to use it now. I love watching old films... I love comedy too!” (Female, 63) However, there are some challenges as many of the participants shared how they would forget easily after one workshop and that repetitive training was needed, “Last time he [staff] taught us Whatsapp it was around half a lesson, because the first part he taught other things… taking photos, but I told him that I still don’t understood the part of Whatsapp… ha ha … but I can handle photo taking. They taught us few weeks ago but I couldn’t remember at all!” (Female, 63)

Theme: Trolleys Lessened Occupational Hazards and Increased Efficiency of Picking (n = 10, 33%)

Ten out of 30 participants discussed about their new trolleys, noting increased carrying capacity and efficiency. “My normal trolley can’t carry too many cardboards, so normally I have to go do a few more rounds. The upgraded trolley can carry more cardboards” (Female, 65). Others talked about the importance of the brake on the new trolley as this participant shared “The design of the trolley is good. There is a handle, and like a bicycle, it has a brake. It is difficult to walk downhill if there is no brake” (Female, 75). Interestingly, some participants mentioned how the trolley was too valuable (as it was not uncommon for trolleys to be stolen), as one participant shared, “Yes, it is such a decent trolley! You know, I still feel unsafe putting it on the street, I was telling [staff] that I would rather return back the trolley. I am afraid of people stealing it” (Female, 77).

Theme: New Friendships (n = 10, 33%)

Thirty-three percent of the participants discussed how the network provided opportunities to develop new friendships. As one participant shared, “I usually say hello to them [other members], so we start to know each other. Yes, I know more friends, chatting with them, laughing with them… it is really good. Yes, we are close” (Female, 63). Another participant echoed this sentiment, “Yes, I am happier. It is different. I know more people… I am happier” (Female, 73).

Theme: Outreach to Engage Socially Excluded Older Pickers (n = 30, 100%)

All of the participants were met through outreach, by staff of the Pickers’ Link program who visited the streets in which the participants worked at. As one participant shared, “One time I was picking cardboards on the streets and I saw a young girl next to me also picking, I first thought ‘life isn’t easy for youngsters nowadays’ as I thought she was also a waste-picker. I was thinking I should leave some cardboards for her. But then, she gave the cardboards to me and introduced herself. I was so touched, she was so kind. Yes, I thought she also picking the cardboards, who would’ve thought someone would actually help me out!” (Female, 71) Importantly, participants shared that it was through frequent visits on the streets that they began to build trust and rapport with the staff. As one participant explained, “You know, I am busy in collecting cardboards. So, I don’t really have chance to meet anywhere else” (Female, 68).

Theme: Volunteer is an Opportunity to Give and Receive (n = 24, 80%)

Eighty percent of the participants reflected on their involvement in volunteer work, highlighting its positive effects and the mutual benefits of giving and receiving through such activities. A participant with eye health issues recounted a meaningful story of assisting another senior through volunteering, “Doing telecare - I am pretty happy. There was a special

case. I called that person and she received the call quickly, and told me that she was blind. I was surprised that she could receive the call quickly. I told her that I was facing that same problem… the doctor said I maybe blind if my condition doesn't stabilize. How can I handle this? I have no children, and my husband passed away already. I asked her, what can I do? She told me to notice more about my living environment. Like when I am in the lift, I could try to close my eyes and press the button for my floor. Yes, I have to start practicing now. So, after she taught me, I started to notice those details… and l learn more" (Female, 63). Another participant explains how helping others through volunteer work brings joy to her, "I feel happy when I joined voluntary work in the past. I think you should have the same feeling? You have joined voluntary work before, right? Even if you help elderly, kids, or disabled people - you are happy. You think you can help others, and you feel happy" (Female, 63).

Theme: Mobility as Barrier to Participation (n = 7, 23%)

Seven of the thirty participants shared how despite an interest in engaging more or in different types of activities, their limited mobility acted as a barrier to participation. As this participant shared, "They [staff] asked me last time too, but my foot was aching last time so I couldn't join. Whenever I feel alright, I will definitely come, right?" (Female, 63) Another participant shared how her activities have decreased due to mobility issues, "Now I seldom join, I can't walk well - like before. I can't walk for a long distance. I have eliminated many activities because of old age. Sometimes, I don't want to go because I have problems during walking. Yes, no choice. I am old now, and it's getting worse each year" (Female, 90). Other participants shared that the physical limitations also created psychological ones. As this participant shared, "I feel pain when I walk for a certain period. I am the slowest person if I walk with others… I feel embarrassed. So, I seldom move, my leg is painful" (Male, 71).

Theme: Unique Needs Being Met (n = 5, 17%)

Another key theme identified by five (17%) of the participants was that the Pickers' Link addressed unique needs, including aiding a member in having picking-related charges dismissed through public support, as she explained "I remember one time I was charged by the police while working, and [Staff] found a journalist to cover my story" (Female, 64). Another participant shared how the Pickers' Link offered support to her, while other organizations would turn her away due to her age (under 65 and thus not an "elderly" and able to receive services), "but I still can't receive any benefits. So sometimes I met with other charity organizations, I can't get most of the benefits. For example, free lunchboxes that were offered last time. They requested to see my card…, the senior citizen card. I didn't have it" (Female, 63).

Study Limitations

Our study has limitations that impact generalizability; notably, the mixed-methods sample of 42 from 93 intervention group members does not represent the broader population of approximately 2,900 older waste pickers in Hong Kong. A further limitation arises from the potential for bias due to the second author's dual role in both developing the intervention and administering the pre- and post-tests. Also, the study's reliance on one coder for qualitative analysis may bias results; we counteracted this by employing peer debriefing (McMahon & Winch, 2018) and triangulating qualitative with quantitative data for robustness. Our study may be influenced by social desirability bias, as indicated by participants' reticence to criticize services. To reduce this, the interviewer, independent of the NGO, employed subtle questioning techniques to elicit more candid responses (Bergen & Labonte, 2020).

Another limitation in our study design arises from the demographic analyses, indicating significant age distribution differences between the quantitative and qualitative samples. This discrepancy may be partly due to incomplete age data, as 11 out of the 30 participants in the qualitative study did not disclose their ages. However, the qualitative study's focus on perceptions, unmet needs, and Pickers' Link impacts negated the need for identical participant ages in both studies. Also, nondisclosure of some demographics by participants in our qualitative sample of 30 limited analysis by attributes such as age, and living arrangements, suggesting a need for future research to capture these nuances.

Further, in the quantitative data, seven of 35 participants missed reassessments due to relocation or unavailability. However, our statistical analysis showed no significant demographic or physical differences between participants who completed the study and those who dropped out, suggesting the findings may still be generalizable to the dropout group. Although our participants in the quantitative study only reported clinically meaningful post-treatment pain reduction, the limited post-treatment improvements in other physical measurements might be limited by insufficient number of treatment sessions and the small sample size. The post-treatment improvements may also be ascribed to the phenomenon of regression to the mean (Barnett et al., 2005) or the variable natural history of pain, which can manifest as transient, recurrent, and chronic (Van Korff, 1994). To further explore the dose-response effect or effectiveness of our multimodal intervention, future randomized controlled trials should be conducted, incorporating an untreated control group for reference.

Discussion and Applications for Practice

The study aimed to explore the mechanisms and influences of a complex multimodal and multi-level community-based program. While the absence of a control group precludes definitive conclusions about the program's impacts, the findings did indicate observed

improvements among participants: enhanced social network and social participation, reduced occupational hazards, and clinically meaningful improvement in pain. Contributing mechanisms included: outreach activities, integration of bio-psycho-social (BPS) activities, balance of activities of familiarity with novel activities, integration of problem based with strengths-based activities, and flexible and individualized approach to meeting unique needs.

Interpreting these results for gerontological social work, particularly with informal and precarious workers, crucial discussion points emerge. Outreach practice is essential for accessing this often hard-to-engage population, making it a non-negotiable priority in practice and design for programs. Practitioners developing programs for older informal and precarious workers should thus consider outreach a significant and determinant aspect of success. Although outreach is a recognized part of social work, discourse on its methodologies, skills, or perspectives for effectiveness is limited, signalling a need for more focused attention on this aspect.

Another goal of the program's outreach was to foster local understanding and empathy for older pickers, thereby promoting a gradual shift toward a picker-friendly community through public education. This approach adheres to transformational principles that advocate adapting environments to serve diverse groups (Grymonprez & Roose, 2022). We recognize a limitation, however: the lack of data to measure the impact of our activities on community attitudes. Future efforts could strategically continue to promote social work practices that tailor community environments to the varied needs of groups, challenging prevailing societal norms.

Second, our findings highlight the importance of integrating biological and psychosocial health measures in programs for older informal and precarious workers. Andrasfay et al. (2021) reviewed occupational health literature and identified posture, force,

vibration, and repetition as key risk factors contributing to musculoskeletal disorders from work-related injuries or chronic strain. While this research focused on formal employment, they noted that jobs with high physical risk often have lower compensation and seldom offer employer-sponsored health insurance, compounding difficulties in addressing work-related injuries. Workers with lower education levels often endure more physically demanding jobs than their better-educated counterparts. This is especially true for older informal and precarious workers, like Hong Kong's Cardboard Grannies, who lack employer health insurance, have lower education levels, and face age-related physical decline, which elevates their risk for musculoskeletal problems and physical function issues in later life. The biological dimension of the BPS model is thus crucial in gerontological social work for this population. Despite the BPS model's recognition in social work, Maynard et al. (2018) noted limited contributions to its biological aspect. Our research underlines the need to rectify this gap, particularly for gerontological social work with older informal and precarious workers.

Mitigating occupational hazards is a significant aspect of promoting healthy aging among older informal and precarious workers, both during their active working years and beyond retirement. Occupational injuries correlate with negative health outcomes, becoming more severe when such incidents occur at an advanced age. Hasebe and Sakai's (2018) study in Japan, using industry-wide data from 2005-2016 and individual-level data from the late 2000s, revealed an increased likelihood of experiencing work-related accident as a worker's age progresses, with those over 60 more likely to suffer fatal injuries. Although the study focused on older employees in formal sectors, it is reasonable to assume that the adverse outcomes might be amplified for older workers engaged in physically demanding labour within the informal economy.

Third our findings also indicate the value of diversifying activities in programs for older informal and precarious workers to enhance engagement and social participation.

Balancing familiar tasks like farming with new experiences like tourism and smartphone education, and including strength-based options like volunteering, is key. The familiar activities may engage participants by drawing on their existing knowledge, skills, and experiences. The results show that participants offer valuable contributions to society, not just as care recipients but as knowledgeable and skilled individuals. While the participants are from a socially marginalized and underserved group, they should not be seen from that perspective only. Two truths can coexist – and this theme indicates that on one hand the participants experience social exclusion and marginalization; thus, require support. On the other hand, the participants also hold knowledge, skills and experience and are willing and able to contribute to society and help others. Opportunities to volunteer and give back, should be made available to all regardless of socioeconomic status, as the one participant so aptly reminded us of our shared humanity and the joy of being of service to others: “I think you should have the same feeling? You have joined voluntary work before, right?” This theme also highlights the reciprocity within volunteer opportunities, as illustrated by the one participant who was providing telecare to another vulnerable older adult, and ironically was the one who received a lot of support. This theme suggests that volunteer opportunities engaging the members is a meaningful activity that should be maintained and developed.

Finally, in the interpretation of our findings, a significant point of discussion is that program flexibility may have been an important mechanism related to the improvements of the participants. This aspect is particularly pertinent to social work practice as it underscores the importance of adaptable programming and support services to cater to diverse and unique needs. The dynamic nature of the Pickers' Link program may have been significant factor in the observed changes in the participants. Practice recommendations include the deliberate design of such programs as open systems capable of adapting to the unique and specific service needs of their participants. Such a complex open system design also necessitates

flexible evaluation methods (Judge & Bauld, 2001), which can be "used to understand processes and their impact" (p. 36). Thus, recommendations are made not only to program design, but evaluation designs that prioritize pragmatism and learning to continually develop such complex interventions.

Conclusion

The prevalence of older adults in informal and precarious employment underscores the need for specialized healthy aging interventions. These individuals often face more pronounced health and well-being challenges than those in formal sectors, both during employment and after retirement. Our study, through a pioneering collaboration between social work and rehabilitation sciences, examines a program aimed at aiding Hong Kong's Cardboard Grannies. It assesses the program's influences and operational mechanisms, presenting a unique methodological approach for evaluating complex community initiatives. The findings illustrate the potential of interdisciplinary collaboration in designing and assessing interventions, advancing the development of innovative support strategies for healthy aging. This research contributes a novel dimension to the research base, informing both social work practice and social care policy globally.

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Table 1

Demographic Information of Participants in the Qualitative Study (n =30) and Quantitative Study (n = 28) who completed the data collection

	Qualitative research Participants	Quantitative research participants	
Gender			Chi-square = 0.23; P = 0.63
Female	26	23	
Male	4	5	
Age			Chi-square = 11.57; P < 0.01
Young-old (65-74)	6	14	
Middle-old (75-84)	9	10	
Old-old (85+)	4	4	
Undisclosed*	11	0	
Education			Chi-square = 0.003; P = 0.96
Primary Education or Less	29	27	
Secondary Education Completed	1	1	
Length of living in Hong Kong			Chi-square = 1.14; P = 0.77
Less than 10 years	2	2	

11-30 years	6	5	
30+ years	6	3	
Undisclosed*	16	18	
Living arrangements			Chi-square = 5.19; P = 0.16
With spouse	6	8	
With family	9	8	
Alone	6	12	
Undisclosed*	9	0	
Housing type			Chi-square = 0.70; P = 0.70
Subsidized public housing	19	20	
Private flats	4	2	
Undisclosed*	7	6	
Marital status			Chi-square = 0.77; P = 0.68
Married	9	10	
Widowed	13	9	
Undisclosed*	8	9	
Years of waste-picking			Chi-square = 1.21; P = 0.88
1-5 years	4	6	
6-10 years	11	9	

11-20 years	6	7
21+ years	6	4
Undisclosed*	3	2

*Undisclosed indicates participants chose not to reveal the specified characteristic in the interviews.

Table 2

Pre- and Post-Test Assessments of Pain, Mobility, Cognitive Function, and Muscle Strength in Quantitative Study Sample

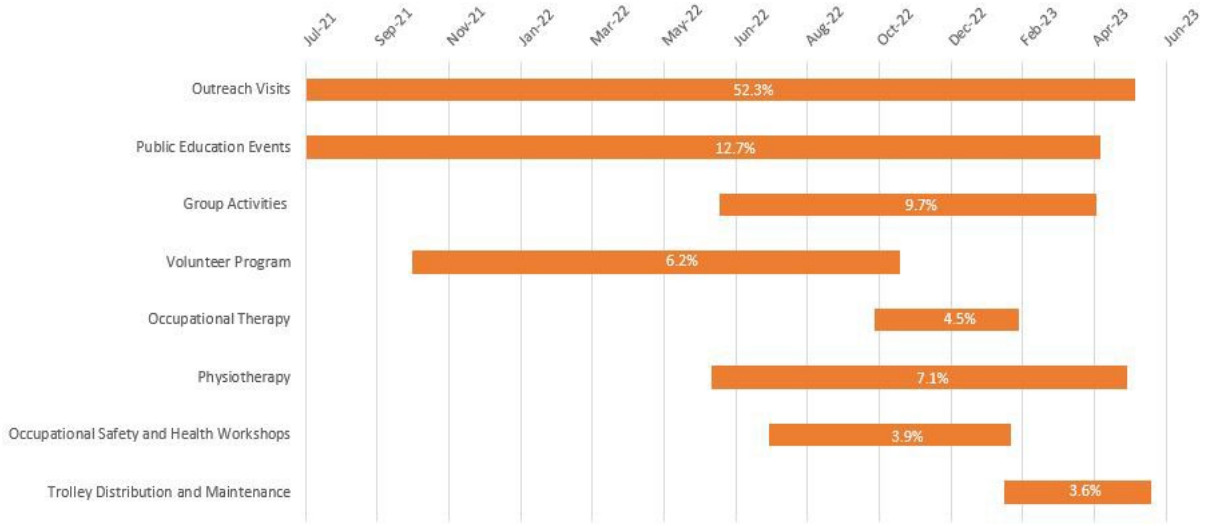
	Pre-test Mean (standard deviation)	Post-test Mean (standard deviation)	Mean difference (95%CI)	Cohen's d	Two-tailed p value
Vital sign					
Systolic blood pressure (mmHg)	133.6 (21.4)	143.0 (35.1)	10.3 (--2.2 to 22.8)	0.32	P = 0.101
Diastolic blood pressure (mmHg)	83.2 (12.3)	84.0 (12.5)	0.75 (-`13.0 to 14.5)	0.05	P = 0.774
Heart rate (counts/minute)	72.7 (11.5)	73.9 (12.3)	1.18 (-3.80 to 6.16)	0.24	P = 0.221
Body mass index (kg/m^2)	21.5 (5.2)	21.3 (5.2)	-0.18 (-1.22 to 0.86)	0.18	P = 0.466
Subjective assessments					
Numeric pain rating scale of pain (out of 10)	6.3 (2.7)	2.9 (2.3)	-3.3 (-4.3 to -2.2)	1.37	P < 0.001
Fall Efficacy Scale	25.5 (7.5)	26.5 (10.3)	0.3 (-3.1 to 3.8)	0.04	P = 0.851

Montreal Cognitive Assessment (MoCA)(out of 30)	18.5 (4.6)	20.6 (4.6)	-2.2 (-3.8 to -0.6)	0.55	P = 0.009
Objective measurements					
Grip strength (left) (kg)	22.9 (7.9)	20.6 (7.6)	-2.2 (-0.4 to -4.4)	0.40	P = 0.046
Grip strength (right) (kg)	23.1 (8.2)	21.9 (7.4)	-1.3 (-0.7 to 3.2)	0.24	P = 0.210
30-second sit-to-stand test (count)	10.9 (3.8)	12.1 (3.2)	1.2 (0.3 to 2.1)	0.50	P = 0.861
40-meter fast paced walk test (m/s)	1.1 (0.3)	1.1 (0.3)	-0.006 (-0.1 to 0.1)	0.03	P = 0.205
6-minute walk test distance (m)	340.6 (97.1)	328.5 (135.6)	-14.2 (-33.5 to 61.9)	0.13	P = 0.544

95%CI: 95% confidence interval

Figure 1

Pickers' Link Two-year Activities Timeline



Note. This figure lists the 308 types of activities conducted over two years, detailing their occurrence rates and proportions in the program.