BMJ Open

Cost–benefit analysis of a 24/7 text-based online emotional support platform for at-risk youth in Hong Kong

Paul Siu Fai Yip ,[1,2] Junyou Chen,[2] Raymond Lap Ming Tang ,[1] Chee Lam Isabel Chau,[1] Wing Man Katherine Cheng,[3] Enoch N C Lui[4]

To cite: Yip PSF, Chen J, Tang RLM, *et al*. Cost–benefit analysis of a 24/7 text-based online emotional support platform for at-risk youth in Hong Kong. *BMJ Open* 2026;**16**:e107806. doi:10.1136/bmjopen-2025-107806

► Prepublication history and additional supplemental material for this paper are available online. To view these files, please visit the journal online (https://doi.org/10.1136/bmjopen-2025-107806).

Received 11 July 2025
Accepted 02 March 2026

[1]The HKJC Centre for Suicide Research and Prevention, The Univsersity of Hong Kong, Pokfulam, Hong Kong
[2]Department of Social Work and Social Administration, The University of Hong Kong, Pokfulam, Hong Kong
[3]The University of Hong Kong, Pokfulam, Hong Kong
[4]The Hong Kong Polytechnic University, Kowloon, Hong Kong

Correspondence to
Raymond Lap Ming Tang; rlmtang@hku.hk

ABSTRACT

Objectives This study was to estimate the potential social value and net benefit of OpenUp, a 24/7 text-based online counselling service for youth in Hong Kong, and draw policy-relevant conclusions for service provision.

Design A retrospective, model-based cost–benefit analysis using social return on investment (SROI) methods. Adopting a societal perspective, service, health and social outcomes were valued over a 1-year period, and productivity gains associated with avoided suicide deaths were valued over a 10-year period. Costs are reported in 2022 HK dollars (HK$; US$1=HK$7.8). Reporting was guided by Consolidated Health Economic Evaluation Reporting Standards 2022 (CHEERS 2022) Statement.

Setting A text-based, synchronous online emotional support counselling platform in Hong Kong was accessible through WhatsApp, Facebook, SMS and the official web portal.

Participants A total of 19 543 users aged 11–35 years accessed OpenUp services during the study period (1 December 2020 to 31 May 2022).

Primary and secondary outcome measures These included total social value (HK$), net social benefit (social value minus investment) and the SROI ratio. The secondary outcomes included monetised savings in medical and social services and productivity gains from avoiding suicide attempts and death.

Results The total social value was estimated to be HK$226 119 729 against an investment of HK$47 655 000 (SROI=4.74). Suicide risk reduction (productivity gains from avoided attempts and deaths) accounted for 75.4% of the social value. Deterministic one-way sensitivity analyses yielded SROI values ranging from 3.62 to 6.99 aggregated across the three groups, with results being most sensitive to assumptions about the duration of productivity impacts for avoided attempts and avoidable mortality.

Conclusions Based on conservative assumptions, OpenUp can generate potential social value by providing an online emotional support service. Given the study's reliance on modelling and proxy monetisation, these estimates should be interpreted with caution. Further integration of offline services with online intervention strategies requires continuous investment and evaluation.

STRENGTHS AND LIMITATIONS OF THIS STUDY

⇒ We conducted an economic evaluation of an online mental health intervention tool for youth in Hong Kong using SROI. The reporting was guided by the CHEERS 2022 statement.
⇒ Low survey response rates (prechat surveys, 37.0%; postchat surveys, 5.4%) may have introduced selection bias and affected the SROI estimates.
⇒ Given the study's proxy monetisation and model-based assumptions, the findings reflect potential social value rather than realised outcomes.
⇒ Limited heterogeneity was observed owing to restricted data stratification and the absence of subgroup analyses.

INTRODUCTION

Mental health problems among people aged 11–35 years have recently been identified and are emerging as a worldwide concern that deserves to be urgently addressed. Various studies have suggested that mental health problems are currently a significant contributor to the global disease burden of adolescents and young people, and depression and anxiety disorders are currently the top contributors to the burden of years lived with disability.[1 2] Estimates show that in high-income countries, one in five adolescents or young adults is currently diagnosed with a mental health problem. In low-income and middle-income countries, the number is generally lower owing to a lack of surveillance and the significant stigma associated with mental health problems.[1 3] These problems significantly affect education, work and social performance, thereby affecting both individual and overall productivity.[4 5]

Hong Kong reflects this trend, and recent studies have shown high instances of psychological morbidity among secondary and tertiary students. In the wake of the pandemic, it has been found that close to half of secondary school students and more than 40% of university students suffer from

depression. Instances of anxiety and stress are also high, reflecting the susceptibility of these populations.[6 7] Such observations are alarming, and high-density and competitive educational systems, along with political pressure, increase susceptibility to such problems.[2 8]

The economic impact of untreated mental health disorders is significant. Direct costs include psychiatric consultations, hospitalisations and emergency care, whereas indirect costs include productivity losses, absenteeism and reduced lifespan.[9 10] In Hong Kong, it has been forecasted that, if left untreated, depression alone could result in annual health costs of more than HK$2.5 billion by 2032, aside from high social welfare costs. From the perspective of welfare economics,[11] such costs indicate forgotten benefits. Other resources could generate greater benefits if mental health initiatives were maximised.[10 12] As such, policymakers are increasingly turning to sound economic evaluations to guide decisions on resource allocation, thereby optimising value for money and the principles of allocative efficiency.[9 12]

Unfortunately, the number of conventional mental health facilities is insufficient in the face of such urgent demands. Moreover, waiting times are long, and community programmes often face overcrowding, leaving them unprepared to handle referrals after service delivery.[8 13] Attitudinal barriers also hinder access to care. In relation to stigmatisation, what discourages individuals, most notably youths, is the social and confidentiality impact.[3 7] Furthermore, studies have shown a correlation between stigmatisation and reluctance to seek assistance, thereby emphasising the gap between treatment and service.[3 14]

Digital mental health interventions have been found to hold great promise for addressing system-related problems. Online platforms support anonymity, convenience and scalability, among other attractive features, for the technology-savvy younger generation.[15 16] Globally, it has been found that text-based counselling helps alleviate depressive and anxiety problems, improve self-based and interpersonal-based coping styles and, to some extent, is also known to alleviate suicidal thoughts.[17 18] Moreover, digital tools can augment conventional care systems by providing on-the-spot support during emergencies and preventing deterioration, which could require urgent assistance.[19 20] While their clinical efficacy has been proven, the literature on cost-effectiveness, particularly within the Asia-Pacific region, is relatively underdeveloped.[4 15] This has certainly made it more challenging for policymakers to make informed decisions regarding cost-effectiveness and sustainability.

OpenUp initiative

In this context, the OpenUp project was founded in Hong Kong to support individuals aged 11–35 years on a 24/7 basis through text messages. OpenUp is managed by a coalition of five non-governmental organisations (NGOs) and sustained by philanthropic funding. OpenUp incorporates a wide array of communication tools, including WhatsApp, Facebook, SMS and web portals, to provide instant counselling support.[17 18] OpenUp has adopted a hybrid team of experts consisting of certified social workers, counsellors and volunteers to ensure scalability and quality assurance.[18 20] Initial assessments have established that OpenUp improves beneficiaries' emotional well-being, decreases instances of suicidal ideation and supports offline referral when mandated.[17 20] Meanwhile, OpenUp's efficiency, although commended by such efficacy, raises questions regarding its macroeconomic relevance. Does OpenUp, under such conditions, deliver adequate social returns to support sustained investments and integration into the Hong Kong mental healthcare system?

Economic evaluation

Economic evaluation provides a systematic framework for assessing the value of mental healthcare interventions (eg, by comparing costs and outcomes across alternatives).[21 22] When the policy question extends beyond health sector outcomes to include broader consequences and cross-sector resource allocation, such as impacts on education, employment, social participation and stigma, decision-makers often require an appraisal that expresses both costs and benefits in a common unit. A cost–benefit analysis (CBA), based on welfare economics, meets this need by placing a dollar value on both benefits and costs. This makes it possible to compare different interventions and sectors and helps with net benefit calculations.[10 12] The idea of social return on investment (SROI) is based on the principles of CBA. It combines a wide range of outcomes, including non-clinical and societal effects, into a single metric that shows the value created per unit of investment.[23 24] This approach aligns with growing policy agendas focused on well-being, intersectoral impacts and needs.[25 26]

The present study

To fill this gap, we seek to place financial value on the number of avoided suicides and suicide attempts, as well as health and social service utilisation. In doing so, we take a broader approach, recognising that the value of interventions aimed at mental health is not confined to the health sector. The wider importance of such interventions and their associated value is particularly significant for Hong Kong, given the role that mental health plays in educational and labour market pressures. The Youth Development Blueprint issued by the Hong Kong government reflects the government's strong commitment to the overall well-being of youth. To achieve this vision, it is necessary to develop and implement economically sound evidence-based approaches. An economic evaluation, such as the present study, may help policymakers focus on investment priorities to derive maximum societal benefits. Regarding funding models, although philanthropic support has been beneficial to OpenUp, future success may come from the government and mixed sources. Specifically, the objectives of this study are to:

1. Bridge the evidence gap by empirically examining the impact of OpenUp,
2. Explore the policy implications of these findings and how they might influence mental health service provision strategies for youth.

METHODS

Design

We conducted a model-based CBA using the SROI method. We chose this methodology because we lacked individual-level counterfactuals and postservice utilisation data owing to privacy issues. The intervention was provided as a service and was not included in a randomised controlled trial.[23 24] We reported the methods and results of our study following the Consolidated Health Economic Evaluation Reporting Standards 2022 (CHEERS 2022) Statement (online supplemental material 1).[12] The SROI method helps identify stakeholders, adjust impacts (attribution and deadweight) and calculate the SROI ratio.[25 27]

Perspective and time horizon

We adopted a societal perspective to capture the effects of OpenUp in Hong Kong, spanning across healthcare (Accident and Emergency (A&E) visits and inpatient and outpatient interactions), social services (youth service funding), and productivity (the value of lost earnings avoided). We report detailed results for health and social services to support sector-specific decision-making.[9 12]

We evaluated resource use outcomes over a 1-year period, which reflects the time during which de-escalation could reasonably prevent emergency use and routine contact. The productivity benefits of preventing suicide deaths were assessed over ten years to recognise long-term effects while remaining cautious without age-specific data. The productivity gains from avoided attempts were evaluated for over a year, aligning with the short-term consequences of crises.[10 12] All values are presented in 2022 HK$, with unit costs and wages adjusted to the 2022 price year based on official statistics. We did not apply discounting because of the preliminary nature of the estimates and the short time span. The duration assumptions of the sensitivity analyses were explored.[9]

Study population

The study included all users who interacted with OpenUp during the evaluation period (1 December 2020 to 31 May 2022), defined as those who had at least one valid chat (ie, four or more messages exchanged between the user and counsellor). During this period, 19 543 unique users met this criterion, with an average of 2.5 valid chats per user (online supplemental material 2). Optional surveys before and after the chats were used to gather information on concerns and perceived outcomes. Survey respondents, with response rates of 37.0% (n=7227) prechat and 5.4% postchat (n=1065).[18 20] Based on the prechat question 'In the past 2 weeks, have you thought about hurting or killing yourself?' A total of 41.2% reported suicidal thoughts (8052 of 19 543 users), whereas 58.8% did not report suicidal thoughts (11 491 users). Literature-based estimates have classified individuals with suicidal thoughts over the past 12 months as potential suicide attempters. Some of these attempts were considered likely to fail, which informed our counterfactual modelling in the absence of OpenUp and varied across sensitivity analyses.[2 15]

User classification and counterfactual projections

We established a cautious counterfactual path for users with suicidal thoughts using transition rates from the literature. In a study on adolescents in Hong Kong, 31.8% of those with such thoughts were expected to attempt suicide within 12 months of ideation. When applied to 8052 individuals, this estimate suggests that 2484 attempts would be made in the subsequent year. With longer follow-up periods, a Western cohort study showed that 3.22% of those who attempted suicide died. Suppose we applied this carefully and considered the contextual differences, 77 potential deaths would be indicated. The remaining 5491 cases were classified as ideation only for modelling. These numbers were used solely to estimate potential paths without OpenUp and were examined in a sensitivity analysis to address parameter uncertainty.[2 15] These figures aim to estimate potential paths without OpenUp, rather than the actual outcomes, in line with model-based evaluations.[12]

Programme costs and inputs

The total investment in OpenUp during the evaluation period was HK$47 655 000, funded by the Hong Kong Jockey Club Charities Trust. This includes staffing costs (counsellors, social workers and supervision), digital systems, training and overhead expenses. Research-specific costs were excluded from the analysis. We updated all costs to 2022 HK$, where appropriate. The total investment serves as the denominator of SROI. Costs are reported in 2022 HK dollars (HK$; US$1=HK$7.8).[24 25]

Measurement and valuation of outcomes

We examined five outcome categories and conducted stakeholder interviews: (1) prevented suicide; (2) prevented suicide attempts; (3) reduced emotional distress based on average youth service case costs; (4) reduced medical service use (A&E visits, hospitalisation after attempts, General Practitioner (GP) visits and psychiatric outpatient visits) and (5) reduced bereavement-related support linked to fewer deaths[24 27] (online supplemental material 3). We selected outcomes based on their significance, clarity of available data and feasibility of assigning monetary values using local or transferable substitutes.[23 25] Despite considerations of stigma of mental health among the young, it was not monetised due to measurement and valuation constraints.

Quantities were gathered from (1) OpenUp administrative data (usage and valid chats); (2) prechat and postchat surveys (ideation, alternative help-seeking options and perceived usefulness) (online supplemental material

Table 1 Monetised outcomes and potential social value components by domain

Overview	Total	Cost per Individual (HK$, 2022 price year)
Cost of the OpenUp project	47 655 000	2438
Social value generated across stakeholders	226 119 729	11 570
Cost difference	178 464 729	9132
Outcome	**Number of users**	**Cost savings**
Users		
Avoided a potential death by suicide*	77	37 702 852
Avoided a potential attempt at suicide	2484	107 209 463
Reduced emotional distress for people with suicidal ideation but no action	5491	7 415 569
Reduced emotional distress for people without suicidal ideation	11 491	17 652 059
Reduced the cost associated with bereavement recovery	462	579 481
		170 559 424
Medical services		
A&E utilisation for users with suicidal ideation	8052	505 205
A&E utilisation for users without suicide ideation	11 491	820 099
Reduced hospitalisation for potential attempted suicide	2484	31 534 180
Reduced general practitioner utilisation for people with suicidal ideation	8052	150 226
Reduced general practitioner utilisation for people without suicidal ideation	11 491	243 862
Reduced psychiatrist utilisation for people with suicidal ideation	8052	1 014 861
Reduced psychiatrist utilisation for people without suicidal ideation	11 491	1 647 423
		35 915 856
Social services		
Reduced case cost under subvention for youth service for users with suicidal ideation	8052	7 488 452
Reduced case cost under subvention for youth service for users without suicidal ideation	11 491	12 155 997
		19 644 449

*Outpatient quantities aggregate ideation/non-ideation groups; attribution and deadweight applied; productivity gains are included under 'users—avoided attempts/deaths'.
A&E, Accident and Emergency.

4) and (3) external literature on transition rates from thoughts to attempts (31.8% within 12 months in a Hong Kong adolescent group) and from attempts to death (3.22% in a long-term cohort outside Asia, used carefully because of the lack of local long-term data). We valued productivity gains at the 2022 Hong Kong median wage and deaths and attempts at 1 and 10 years, respectively, and it is assumed to be paid work for those aged ≥18 years.

The unit costs for A&E visits, inpatient stays, GP visits and specialist outpatient visits were obtained from the Hospital Authority reports. Alternatives were reviewed using sensitivity analysis, and the average youth service case costs and related social care substitutes were sourced from the SROIHK Social Value Bank.[12 24] When multiple viable substitutes were available, we chose those that reflected local service prices and reporting practices. The alternatives were reviewed using a sensitivity analysis.[23 27]

Impact adjustments

To avoid over-attributing credit to platforms, we adjusted for attribution and deadweight using a postchat survey question (online supplemental material 5). We estimated attribution by asking participants 'If OpenUp did not exist, which other options would you have considered?' (n=176) to assess the share of outcomes likely produced by other actors or options without OpenUp. As for deadweight, it was estimated from the question 'Have you sought help from other organisations or individuals for the problems discussed?' to reflect the portion that might have been improved without OpenUp. We assumed minimal displacement because of OpenUp's additive online model. We did not apply drop-off for 1-year outcomes, as this was integrated into the chosen duration for multiyear productivity effects.[23 24] We calculated the SROI ratio by dividing the total monetary benefit after attribution and deadweight by the total investment.[27]

Handling missing data and non-responses

Participation in the surveys was optional, and the completion rates were low. To evaluate the potential bias from non-responses, we used inverse-probability weighting (IPW) sensitivity checks and upweighted under-represented

groups (eg, males and older youths) using platform metadata. The recalculated weighted results were qualitatively similar to the unweighted results.[18 20] We conducted deterministic sensitivity analyses across plausible ranges of transition parameters from the literature.

Characterising uncertainty and heterogeneity considerations

We performed deterministic one-way sensitivity analyses to explore variations in (1) the duration of productivity impacts to prevent deaths (5–20 years) and prevent attempts (6–24 months); (2) unit costs for medical and social services (0–2×baseline, reflecting price changes and substitute choices) and (3) substitutes for reduced emotional distress and bereavement-related support costs. Formal subgroup analyses (eg, by age, gender and school status) were not available because of the small postchat sample sizes and lack of linked outcomes.

Model verification and quality assurance

All calculations in the spreadsheets were independently checked for internal consistency. We cross-verified the aggregated quantities against platform statistics and confirmed that the SROI components matched the reported totals. We reproduced the figures programmatically to mitigate transcription errors.[12]

Patient and public involvement

Neither the patients nor the public participated in the study design, conduct, reporting or dissemination.[12]

RESULTS

After adjusting for attribution and deadweight, the total social value generated by OpenUp was HK$226 119 729 (online supplemental material 6) compared with a total investment of HK$47 655 000, resulting in an SROI of 4.74. This ratio suggests that, assuming conservative modelling and choices, the platform could be expected to generate HK$4.74 of social value for every HK$1 invested[24 27] across the user, medical and social service domains. The estimated net social benefit (NSB) was HK$178 464 729; however, this figure should be interpreted with caution, given the model-based nature of the calculations.[12 25]

Distribution of social value across stakeholders

The makeup of social value shows that the largest share comes from the reduced risk of suicide among users. This includes mitigating productivity losses by avoiding attempts and deaths, accounting for 75.4% of the total social value (HK$170 559 424). Savings to medical services accounted for 15.9% of the total savings, whereas savings to social services accounted for 8.7%. This distribution aligns with social value creation across different stakeholders, which focuses on providing early, accessible support to reduce crises and maintain human capital, leading to savings in the areas of A&E, as well as inpatient, outpatient and youth social services.[4 5]

Among healthcare savings, avoiding hospitalisation after attempted hospitalisation was the largest, amounting to HK$31.5 million. This reflects the per diem costs and average length of stay in the local adolescent samples. Reductions in A&E visits and outpatient contact contributed approximately HK$4.4 million in savings from GP and psychiatry, which aligns with lower unit costs compared with inpatient care. As for social care, reduced case costs for youth services accounted for approximately HK$19.6 million across both the ideation and non-ideation groups.[8 13] Similar to healthcare savings, these amounts should be viewed as potential savings dependent on de-escalation and substitution effects rather than verified reductions in service use.

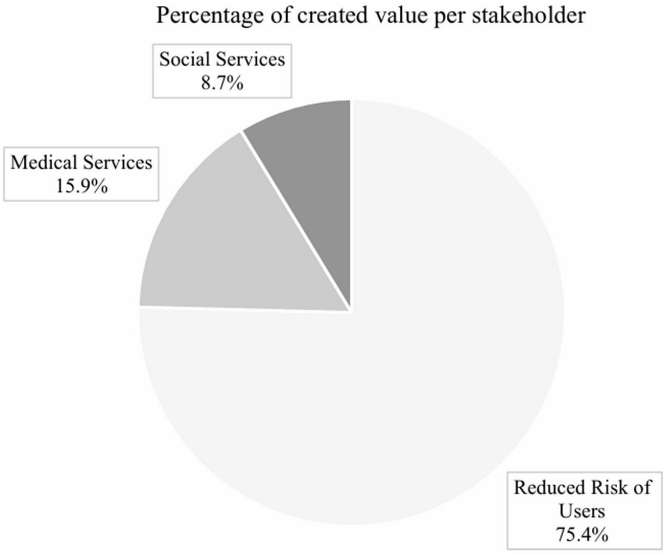

Figure 1 Percentage of created value per stakeholder.

Per-user values and interpretation

On a per-user basis, the social value created averaged HK$11 570 against an investment of HK$2438 per user, yielding a mean net benefit of HK$9132 per user. These averages hide differences in engagement intensity, such as the number and length of chats, outcome profiles (ideation vs non-ideation), and individual paths after the interaction. Nevertheless, they serve as helpful summaries of high-level resource-allocation decisions.[12 25] The findings are summarised in table 1.

Figure 1 shows the distribution of social value among stakeholders: users (75.4%), medical services (15.9%) and social services (8.7%).

IPW checks

As survey participation was optional and completion rates were moderate (37.0% prechat and 5.4% postchat), we performed sensitivity checks using IPW to assign greater weight to underrepresented groups identified in the platform data, such as males and older youths. The weighted recalculations yielded results similar to the unweighted results. This suggests that response imbalances did not influence the main conclusions.[18 20] However, IPW cannot account for unobserved differences. Therefore,

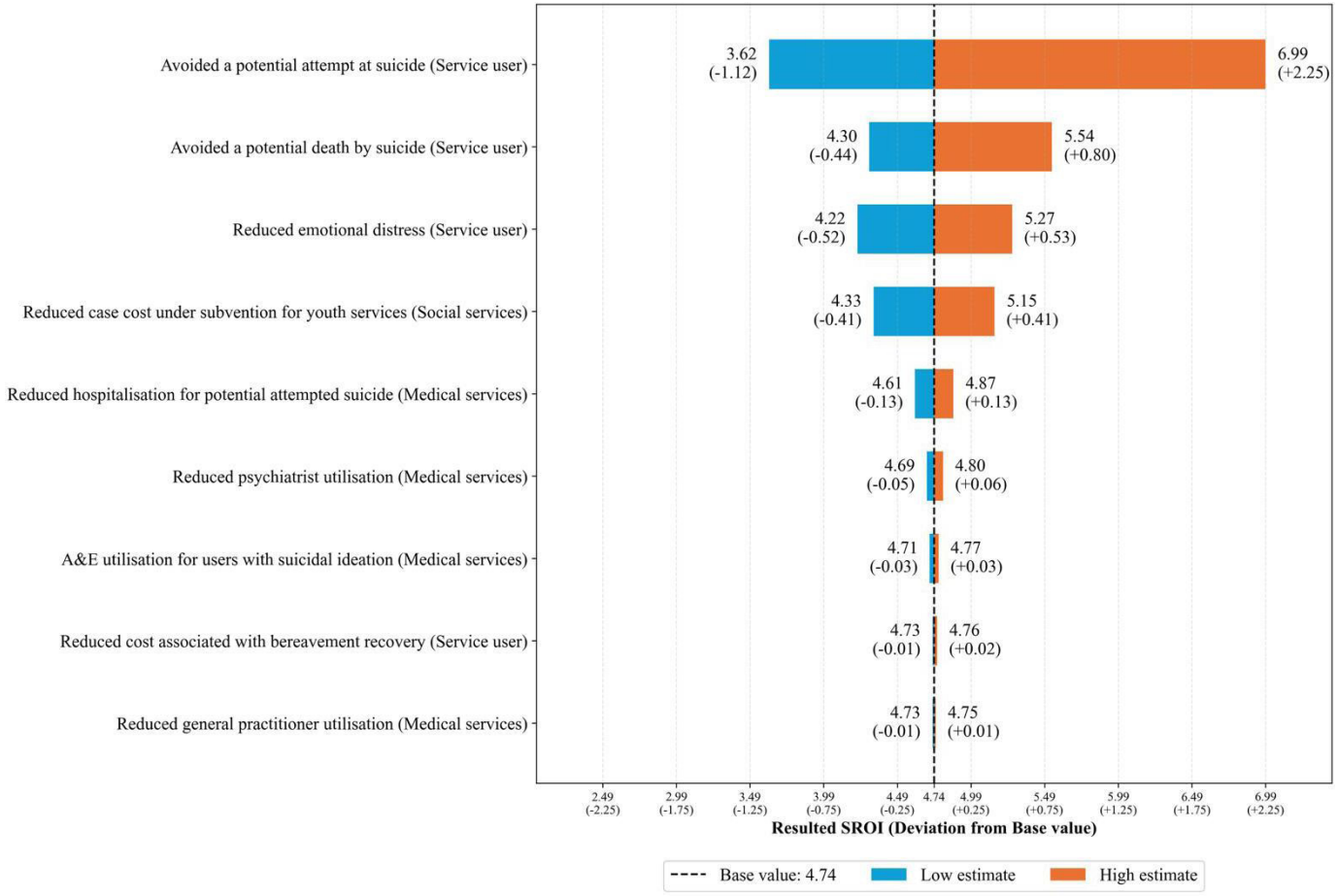

Figure 2 Tornado plot showing results of the SROI sensitivity analysis.

we consider the unweighted figures to be primary and interpret them with caution.[12]

Deterministic sensitivity analysis

The SROI ranged from 3.62 to 6.99. The durations related to productivity impact were the most influential.

Avoided attempts: Changing the post-crisis productivity impact from 6 months (low) to 24 months (high) shifted the SROI from 3.62 to 6.99.

Avoided deaths: Changing the mortality avoidance productivity horizon from 5 (low) to 20 years (high) shifted the SROI from 4.30 to 5.54.

Proxies with moderate influence included emotional distress valuation (youth service case cost), yielding an SROI of 4.22–5.27 when the proxy was set to 0×or 2×the baseline. Health service unit costs had smaller effects; changing A&E unit costs from 0×to 2×shifted SROI from 4.71 to 4.77. Changing hospitalisation days by ±20% shifted the SROI to 4.61–4.87. Bereavement-related proxies showed minimal variations (4.73–4.76).[25 27] Overall, these results show that the estimates are the most sensitive to assumptions about productivity duration and are fairly stable to reasonable changes in healthcare and social care unit costs.

Figure 2 (tornado diagram) illustrates these complements. Table 2 shows the sensitivity ranges and emphasises the importance of the productivity duration assumptions.[27]

Consistency checks and reconciliation

We reconciled all the social value components with the reported total (HK$226 119 729). We cross-checked stakeholder shares (users, 75.4%; medical services, 15.9%; social services, 8.7%) with the underlying outcome valuations. We manually reviewed the spreadsheet formulas to reduce transcription or cell-reference errors and programmatically regenerated the figures to ensure numerical consistency.

DISCUSSION

With regard to the evaluation conducted on OpenUp, an online 24/7 text-based service intended to provide support to youths in Hong Kong, we used a CBA conducted using an SROI approach and model under conservative assumptions and using financial proxies to estimate its value within the Hong Kong financial system. We found that it generated HK$226.1 million of monetised value, with a cost of HK$47.7 million, a corresponding SROI of 4.74, and an NSB value of HK$178.5 million. We found that the value was derived predominantly (75.4%) from mitigating losses in productivity by yielding reduced

Table 2 Sensitivity analysis for SROI of the OpenUp Project

Parameter/assumption	Value of the parameter		Resulting SROI
Service user			
Avoided a potential death by suicide	Base value	Adjusted to 10 years of productivity loss	4.74
	Low estimate	5 years	4.30
	High estimate	20 years	5.54
Avoided a potential attempt at suicide	Base value	Adjusted to 1 year of productivity loss	4.74
	Low estimate	6 months	3.62
	High estimate	24 months	6.99
Reduced emotional distress	Base value	Social work outreach cost in 2022	4.74
	Low estimate	Social work outreach cost in 2022*0	4.22
	High estimate	Social work outreach cost in 2022*2	5.27
Reduced the cost associated with bereavement recovery	Base value	Subvention for enhanced home and community care services	4.74
	Low estimate	Subvention for enhanced home and community care services*0	4.73
	High estimate	Subvention for enhanced home and community care services*2	4.76
Medical services			
A&E utilisation for users with suicidal ideation	Base value	Cost per instance of A&E utilisation (HK$) in 2022	4.74
	Low estimate	Cost per instance of A&E utilisation (HK$) in 2022*0	4.71
	High estimate	Cost per instance of A&E utilisation (HK$) in 2022*2	4.77
Reduced hospitalisation for potential attempted suicide	Base value	Cost per patient per day for hospitalisation in 2022*1	4.74
	Low estimate	Average days spent hospitalised * 0.8	4.61
	High estimate	Average days spent hospitalised * 1.2	4.87
Reduced general practitioner utilisation	Base value	Cost per instance of general outpatient care in 2022*1	4.74
	Low estimate	Cost per instance of general outpatient care in 2022*0	4.73
	High estimate	Cost per instance of general outpatient care in 2022*2	4.75
Reduced psychiatrist utilisation	Base value	Cost per instance of specialist outpatient care in 2022	4.74
	Low estimate	Cost per instance of specialist outpatient care in 2022*0	4.69
	High estimate	Cost per instance of specialist outpatient care in 2022*2	4.80
Social services			
Reduced case cost under subvention for youth services	Base value	Average cost per case for youth services	4.74
	Low estimate	Average cost per case for youth services*0	4.33
	High estimate	Average cost per case for youth services*2	5.15

A&E, Accident and Emergency; SROI, social return on investment.

numbers of suicide attempts and deaths, and to a lesser extent (15.9%) and (8.7%) by inducing changes in the utilisation of health and social services, respectively. With regard to sensitivity, deterministic one-way sensitivity analysis suggests a strong robustness to assumptions regarding the duration of changes to productivity, which were found to span from 3.62 to 6.99 years, and insensitivity to changes to health and social service costs.[24 27] The results conclusively suggest that, under simulated conditions, OpenUp can generate significant social value within the specific sociocultural and sociopolitical conditions of Hong Kong related to the mental health of youths.

The finding that online text-based counselling services could potentially generate positive social value is supported by the global literature, which also highlights the potential benefits of online mental health interventions targeted towards youth.[15 16] Systematic reviews have shown that Internet-delivered interventions for common mental health disorders are often cost-effective when evaluated using cost-effectiveness analysis (CEA), and service utilisation can be reduced when they are delivered correctly.[4 5] Although the metrics of the studies evaluating the return on investment (ROI) of suicide and youth mental health initiatives differ, they generally show a strong ROI in terms of productivity.[26 27] This is not surprising given the potential benefits that could accrue to adolescents, including not only health advantages but also the retention of human capital and promotion of active participation in

the educational and workforce sectors. In this regard, it should again be noted that the focus of the present study is on the potential value rather than on realised benefits regarding cost-effectiveness, which by definition should require a comparative design.[12] Regarding the issue of methodological fit, the ability to use CBA/SROI enabled the consideration of overall benefits beyond the health sector and, most importantly, productivity gains associated with the impact of suicide prevention. In standard CEA, the value is generally calculated on a cost-per-QALY basis; nonetheless, CEA can be expanded from a societal perspective. Our work is consistent with the principles of welfare economics; costs and benefits were assessed using a common denominator, yielding a single ratio that may have meaning for policymakers. Of course, we are aware of the controversial underpinnings of assigning financial worth to life and well-being. However, human capital and proxy valuation approaches, although not strictly representative, are workable approximations to some extent.

Policy implications

In policy terms, the results support and encourage investment in OpenUp as part of a multitiered approach to promote mental health among youths. To support efficient allocation and distribution, a positive SROI suggests that the platform is an efficient use of resources and, when paired with offline support, can provide optimal support to high-risk individuals. The key considerations include the following: (1) referral and treatment integration: integration between education and mental health facilities, including warm transfer protocols and post-transfer follow-through and support; (2) data support and validation: negotiations of ethics-approved deidentified and consent-based data exchange agreements to support validation and understanding of realised decreases in service utilisation; (3) targeted and priority alleviation: increased support and utilisation of risk-stratification techniques, such as machine learning-assisted triage, to identify high-risk youths and ensure universal access to support; (4) staffing and quality support and assurance: investment and support to fulfil counselling and volunteer workforce needs, including high-quality training and supervision and assurance of high-quality risk management and support protocols; (5) equitable access and accommodation: consideration and support to accommodate rural and socioeconomically disadvantaged youths, including assistance regarding devices, language and privacy access and assured protection and (6) hybrid financial models to support and accommodate public and philanthropic sources of sustainable financial resources, including consideration and plans to spread resources and support over a long-term dedicated structure of up to 5–7 years and accommodate and support optimal expansion and evaluation.[8 13] These considerations and applications are also relevant to Hong Kong's Youth Development Blueprint, suggesting an efficient and effective support plan to promote greater global support and understanding, which would enable society to adapt to and participate in promoting greater, more sustainable health and well-being among youths.[4 15]

Limitations

Despite these strengths, the limitations of this study must be considered when interpreting the results. The evaluation of the model using proxy monetisation relies on simulated outcomes rather than postinteraction behaviours. We did not match OpenUp data with health records, thus limiting conclusions on causality and requiring parametric assumptions regarding transition rates between ideation, attempts and death,[12 15] which were not fully adapted to the target context. Despite this conservative analysis, uncertainty remains regarding the platform's impact on productivity, duration and alternative decisions. Survey responses were moderate (prechat, 37.0%; postchat, 5.4%), with potential selection bias and differential non-responses, although IPW tests showed no difference in the conclusions. IPW cannot adjust for unobservable differences (severity, social support and digital aptitude), as noted by Xu *et al*[20] and Yip *et al*.[18] Attribution estimates used 176 postchat responses, and deadweight measures relied on self-reported attempts to access care. Probabilistic sensitivity analysis (PSA) was not conducted because of the lack of empirical distributions for several parameters (such as attribution and deadweight) owing to the small subsamples. Future studies using linked administrative data could facilitate PSA and structural uncertainty analyses. Regarding valuation, a human capital technique (median wage rate) was used to evaluate productivity impacts, with 10 years for avoided deaths and 1 year for attempts. This method has the following limitations: it does not value non-market productivity, it may undervalue younger generations, and it does not fully incorporate quality-of-life changes. Although this raises concerns about transferability and willingness to pay, the statistical value of life was not calculated.[9 10] Thus, these findings represent a low-bound partial measure of social value.

Cost models, service routes and community preferences circumscribe the generalisability of the findings beyond Hong Kong. Nevertheless, the most important finding, that an anonymous and accessible text-based service could potentially unlock social value to de-escalate crises, can also be generalised to most other urban areas.[18 20] Further investigation is required to explore heterogeneity, such that the effects could vary across subgroups defined by age, sex, school status and socioeconomic factors, and potentially reveal important distinctions between first-time and repeat users. Issues of equity include the digital divide (access to devices, connectivity and literacy) and language and community levels of stigmatisation. In future assessments, distributional CBA/SROI analysis or stratification analysis could help identify not only which population derives the greatest benefit but also where gaps exist and whether the distribution is progressive.[3 7]

CONCLUSIONS

Under conservative modelling assumptions, OpenUp could potentially deliver positive social value for young people in Hong Kong, with the greatest potential gains arising from the reduction in suicide risk and related productivity effects in the long term. The SROI estimate (4.74) should be considered a potential social value. However, the pattern of results, reinforced by sensitivity analyses, suggests that an anonymous, scalable, text-based service can be an effective value-for-money component of a broader mental health strategy for youth. Future policies should prioritise integration with offline services, equity-focused expansion and data-informed evaluation frameworks to convert potential outcomes into demonstrable ones over time.

Acknowledgements This study was supported by the Hong Kong Jockey Club Charities Trust in partnership with five NGOs (The Boys' and Girls' Clubs Association of Hong Kong, Caritas Hong Kong, Hong Kong Children and Youth Services, The Hong Kong Federation of Youth Groups and St. James' Settlement). We also extend our sincere gratitude to Prof. Christian Chan of International Christian University, Japan, for his invaluable insights, which significantly contributed to this study.

Contributors PSFY conceptualised the study and is the principal investigator of the OpenUp Project. JC is responsible for writing the original draft of the manuscript. RLMT reviewed, revised and edited the manuscript. CLIC, WMKC and ENCL edited the manuscript. This study is supervised by PSFY. PSFY is the guarantor.

Funding This study was funded by the Hong Kong Jockey Club Charities Trust (2021-0174) and the Strategic Topic Grants Scheme (STG4/M-701/23-N).

Competing interests None declared.

Patient and public involvement Patients and/or the public were not involved in the design, or conduct, or reporting, or dissemination plans of this research.

Patient consent for publication Not applicable.

Ethics approval The Human Research Ethics Committee (HREC) of the University of Hong Kong reviewed and approved this study (approval number: EA210185). All study participants provided written confirmation of informed consent after the purpose of the study and their involvement was explained to them. The methods used in this study were in accordance with the principles and standards of the Declaration of Helsinki.

Provenance and peer review Not commissioned; externally peer reviewed.

Data availability statement Data are available on reasonable request.

ORCID iDs

Paul Siu Fai Yip https://orcid.org/0000-0003-1596-4120

Raymond Lap Ming Tang https://orcid.org/0009-0006-3726-7763

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