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ORIGINAL REPORT

ECONOMIC EVALUATION OF A BIO-PSYCHO-SOCIAL INTERVENTION FOR COMORBID DISORDERS IN A TRAUMATIZED POPULATION IN POST-WAR KOSOVO

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Objective: ***Post-hoc*** **economic evaluation of a bio-psycho-social intervention in post-war Kosovo from a societal perspective.**

Design: **Cost-effectiveness analysis, cost-utility analysis, and partial cost-benefit analysis using data from a randomized controlled trial.**

Patients: **Thirty-four torture/war victims with co-morbid conditions enrolled in 2012–2013.**

Methods: **Participants were randomly assigned to an "intervention" and a "waiting-list" group. Changes in mental, emotional and physical health and functional impairment were assessed before and after treatment, along with increase in labour income as a proxy for productivity gain. The cost of an extra unit of effectiveness and an additional quality-adjusted life year were calculated.**

Results: **The total cost per participant was €1,322 including, or €1,019 excluding, research costs. Wide variations in costs of changes in mental, emotional and physical effectiveness were demonstrated. Multidisciplinary intervention resulted in functional improvement at a cost of €10,508 per quality-adjusted life year gained. With a mean monthly income increase to €133 (18%) after intervention, the intervention cost per participant would be equal to the total increase in monthly income after 4–5 years, assuming the increased level is maintained.**

Conclusion: **Socio-economic benefit associated with quality-adjusted life year gain is shown, although the cost of an additional quality-adjusted life year is above the World Health Organization cost-effectiveness threshold.**

Key words: torture; war; multidisciplinary intervention; co-morbid disorders; cost-effectiveness; cost-utility; cost-benefit; randomized controlled trial.

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Post-war social reconstruction and economic productivity are interlinked with long-term impairment and disability associated with the experience of war. People affected by torture or war are at high risk of developing a range of emotional and physical problems that limit their ability to deal with social life and day-to-day work (1–3). This will have consequences in the post-conflict period, reducing the social integration and labour productivity of individuals, which, in turn, delays economic recovery in the aftermath of conflicts.

In Kosovo, the war in 1998–1999 has been shown to have long-lasting effects, both socioeconomically and on the health of the affected population (4–7). If an intervention is to go beyond reducing symptoms and generate a broad spectrum of improvements, such as restoring social functioning, facilitating people's reintegration into economically productive activities, and alleviating the heavy costs of health expenditure and lost productivity, a holistic strategy for multiple mental and physical comorbidities is needed, if possible, in the victims' home country.

In 2012–2013, the Danish Institute Against Torture (DIGNITY), in collaboration with the Kosovar Rehabilitation Centre for Torture Victims (KRCT), conducted a 10-week multidisciplinary rehabilitation programme in Kosovo, with physiotherapy, biofeedback-supported psychotherapy and social support. The intervention was designed as a randomized controlled trial (RCT) (8).

Previous studies have shown that a multidisciplinary approach can be effective in reducing chronic physical and psychological comorbidities among victims of torture or war (9–13). However, evaluation of rehabilitation interventions has focused mainly on their clinical outcomes. It is equally important to assess the economic value of various interventional approaches; this information is vital for decision-makers to assess how best to use scarce resources to reach sustainable development goals by addressing trauma, impairment, social exclusion and poverty in all their complexity. There are some economic evaluations of interventions among people who have experienced inter-personal violence, but most of them assessed the cost-effectiveness of one treatment modality relative to another (14–16), and few studies have taken comorbid conditions into account. Furthermore, all the treatment programmes evaluated were conducted in countries where domestic resources were adequate to cover the costs of an intervention and provide treatment.

There is currently no information regarding the economic benefits of integrated rehabilitation programmes for a traumatized population in a post-war setting. The present study is the first economic evaluation of a mul-

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tidisciplinary intervention in a resource-poor country, examining the outcome in terms of value for money. Funding for multidisciplinary approaches, which often demand a lot of resources, has to compete with cheaper alternatives that can reduce the symptoms in the short term. Pressure therefore exists to demonstrate that the benefits of multidisciplinary intervention are sustainable in the long run, not only in human terms, but also in monetary terms.

The present paper uses published data from the RCT (8) to examine the potential economic benefits of a multidisciplinary rehabilitation intervention in the resource-limited post-war setting from a societal perspective.

METHODS

Source of data; RCT in northern Kosovo in 2012–2013

A *post-hoc* economic analysis was performed using data from the RCT in Kosovo conducted by DIGNITY and the KRCT in 2012–13. The characteristics of the study participants and details of methods and results have been published previously (8).

The RCT study design involved dividing the 34 participants randomly into 2 equal-sized groups. Members of the "intervention group" took part in a 10-week rehabilitation programme from the start. Members of the "waiting-list group" received the intervention 3 months later. The programme comprised weekly sessions of individual cognitive behavioural therapy and group physiotherapy sessions and was implemented by a trained multi-professional team.

Economic evaluation

When the costs and benefits of a bio-psycho-social intervention impact on society as a whole, a societal perspective is needed when evaluating its consequences. In addition to cost-effectiveness and cost-utility analyses (CEA and CUA), which are generally conducted from the individual payer or patient's perspective and do not necessarily reflect the long-term social benefits of interventions, we therefore also conducted a partial cost-benefit analysis (CBA) to incorporate this societal perspective.

Cost measurement

The cost analysis was performed from the societal perspective, which means that full costs of the programme incurred in both "intervention group" and "waiting-list group" were considered; not only those directly related to the intervention programme, but also indirect costs, such as participants' loss of productivity. The RCT project took place over a period of 18 months. To break down the costs of analysis, the programme was divided into 3 phases[1]. Throughout each phase, costs were classified into direct costs, indirect costs and research costs (Appendix S1[2]). Information on costs and working hours of personnel was recorded by the financial controllers of DIGNITY and KRCT and collected retrospectively from the financial reports.

Two different total cost measures were analysed for 2 evaluation approaches. The first measure, generated for the CEA/CUA, was the total cost of the whole trial composed of cost items over the entire 18-month period. The second measure was the total cost of the intervention composed of the cost items over the 12 months from the establishment period up to and including the treatment provision for the intervention group only. Using the second category of total cost, the incremental cost that was generated for the partial CBA, defined as the difference in the mean cost of intervention between the 2 groups, was calculated further.

Since research costs will vary between the current intervention programme and similar programmes in other settings, the 2 measures of total cost were each calculated twice; once including and once excluding these costs.

Outcome measures

An assessment of both groups at the start of the trial (month 0) provided baseline data. Effectiveness outcomes for both groups were calculated from assessments made 3, 6 and 9 months later.

Effectiveness. Mental and emotional health outcomes included post-traumatic stress disorder (PTSD), depression, anxiety disorders, anger, expressions of hatred and signs of aggressiveness. Physical health measurements included chronic pain, body mass index (BMI) and handgrip strength with mean values from a group of non-traumatized employees of health facilities in Kosovo used to determine the cut-off values (6).

Utility. Quality-adjusted life-years (QALYs) are calculated based on 2 components: the gain in quality of life and the number of life years over which the gain is sustained (17). Assuming the *number* of *years* remains constant and *equal to 1,* QALYs were calculated based on a measure of utility, which was assessed using the 12-item short-form version of the World Health Organization Disability Assessment Schedule scale (WHODAS 2.0) following the recommendation of Internal Classification of Functioning, Disability, and Health (ICF) (18, 19). The 12 items of WHODAS 2.0 have a 5-point scale coded 0–4, with a summed total scale ranging from 0 (no impairment) to 48 (full disability). For this study, the total WHODAS 2.0 score of each participant was converted into a metric score ranging from 0 to 1 (where 0 = no impairment; 1 = full disability). To arrive at a utility measure, the mean functional impairment score was reversely converted using the following formula: (1–mean functional impairment score), in which 0 represents the worst quality of life and 1 represents the full quality of life. The utilities reported by each participant were multiplied by the assumed duration of sustained benefit after intervention (1 year) to estimate the number of QALYs experienced.

Productivity gain. Productivity gain in terms of employment and monthly income was one of the key indicators of success of the multidisciplinary intervention, which aimed, among other things, to help traumatized people reintegrate into the life of the community and gain employment.

Our model, based on the study by Norrefalk et al. (20), assumes that the most important benefit of a multidisciplinary

[1]The project took place over a period of 18 months. In order to break down the costs for analysis, the programme was divided into 3 phases: The "establishment phase" began with a period of planning from January 2012 and ended on 13 September 2012 when the first participant in the intervention group started treatment. This date initiated the "implementation phase", which lasted until the last participant in the waiting-list group finished the treatment on 15 March 2013. The "follow-up phase" lasted for 3 months from March to June 2013.

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rehabilitation programme is to create "healthy time", which can be spent in leisure and work. There is value in an improved state of functioning, i.e. the increase in quality of life that is used in the CUA, but there is also a benefit for society as a whole through gains in productivity. It was not possible in our study to perform a complete CBA, since it is not possible to obtain data on utilization of related health and social services in Kosovo. A partial CBA was calculated using changes in self-reported monthly income, which are closely related to labour productivity, as proxy measurements.

Ethics approval and consent to participate

The study was conducted in accordance with the Declaration of Helsinki and the Danish guidelines issued by the Danish Data Protection Agency (2008-41-2357). The study was evaluated by the Ethical Committee of the DIGNITY and approved by the Ethical Professional Board, Ministry of Health, Kosovo (05-3884), as well being registered at clinicaltrials.gov (NCT01696578) in September, 2012. All patients signed an informed consent for the trial and for the video recording. Since there is a potential for participants to be re-traumatized through prolonged exposure therapy, a plan was put in place to respond to adverse effects. Any participant experiencing such adverse effects was to be referred to KRCT's reference psychiatrist or a hospital, and removed from the trial immediately.

Analysis

The CEA/CUA were used to calculate the cost per extra unit of effectiveness and the cost per QALY gained, respectively. For the continuous parameters (i.e. BMI, pain index, QALYs), the numerator (the mean total cost excluding research costs) was divided by the denominator (the mean difference in effectiveness or in QALYs before and after treatment) (Appendix S2[2]).

For the dichotomous parameters (i.e. PTSD, depression, anxiety, anger or hatred signs, aggressiveness, hand grip strength), the cost of 1 proportion of effectiveness improvement was calculated. Discounting of effectiveness and QALYs was not applied because of the short time-horizon of the analysis.

In the partial CBA, the fulfilment of a condition was examined. The condition for the intervention to be defined as efficient was that the total cost of intervention should not exceed the benefits in terms of accumulated monthly income. The time it would take to get a return on this social investment was calculated by comparing the incremental costs with incremental benefits. The incremental costs were calculated as the difference in the mean cost of intervention excluding research costs between the 2 groups. The incremental benefits were calculated as the difference in the mean monthly income between these 2 groups assuming that the monthly income increased and remained constant after the intervention.

Costs were collected in Danish krone and Euros (€) and then all converted to € using a mean exchange rate from January 2012 to June 2013, with €1 equal to 7.45 DKK. Discounting of costs and projected benefits was undertaken at an annual rate of 3.5%, as recommended by the National Institute of Health and Care Excellence (NICE), UK (21). To incorporate the uncertainty of the costs and projected benefits, the discount rates of 1% and 5% were also included in the sensitivity analysis. All analyses were conducted using Microsoft Excel.

Table I. Cost of the 18-month multidisciplinary intervention programme in 2012

Cost	Item	Total (€)
Direct cost (C_1)	Intervention project planning	2,157
	40-h training workshop	8,773
	Treatment sessions	1,577
	Multivitamins	885
	Supervision	176
	Quality control	2,121
	Administration and overheads	2,090
	Equipment	1,019
	Rent for office space	295
	Travel allowance for treatment	5,528
	Baseline assessment	5,833
Indirect cost (C_2)	Patients' time cost	1,125
Research cost (C_3)	Outcome assessments	9,396
Total cost including research cost	$C_1+C_2+C_3$	40,975
Mean cost per participant	$\frac{(C_1+C_2+C_3)}{(34+28)/2}$	1,322
Total cost excluding research cost	C_1+C_2	31,579
Mean cost per participant	$\frac{(C_1+C_2)}{(34+28)/2}$	1,019

RESULTS

Cost analysis

The total cost of the whole trial over 18 months was €40,975 when discounting at 3.5% (Table I). Direct costs were approximately 74% of the total (Fig. 1). The mean cost per participant was calculated for the whole trial using the mean number of participants enrolled at the beginning ($n=34$) and at the end ($n=28$). The mean cost per participant was €1,322 including research costs and €1,019 excluding research costs.

The difference in the mean cost of intervention over 12 months per participant between the intervention group with treatment (€1,133) and the waiting-list group with no treatment (€265) was €868, which was used as denominator in the partial CBA. The additional cost of the intervention group is owing to the expenditure for a training workshop, the costs of treatment sessions, equipment, supervision, quality control, administration and overheads as well as the rent for the office space where the intervention was delivered.

Cost-effectiveness analysis

On average, the treatment improved all mental and physical symptoms. The CEA showed a wide spread in

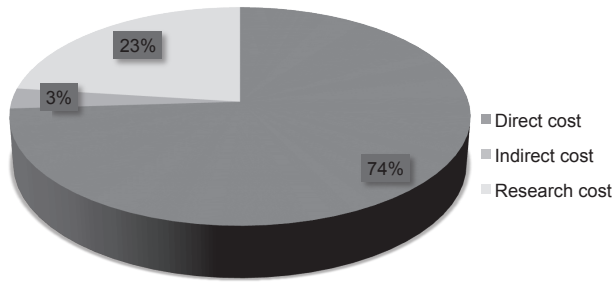

Fig. 1. Percentage of total cost of the whole trial over 18 months.

Table II. Results of cost-effectiveness analysis and cost-utility analysis

	Change in effectiveness before and after treatment (After–Before)			
	Intervention group	Waiting-list group	Mean (95% CI)	Costs of 1 proportion or 1 unit of effectiveness improvement/cost of an additional quality-adjusted life year (€)
Mental health outcome, %				
PTSD	–15.93	–19.67	–17.80 (–31.00, –4.30)	5,724
Depression	–3.57	2.02	–0.77 (–3.80, 2.30)	131,686
Anxiety	3.02	–11.34	–4.16 (–11.00, 2.90)	24,503
Emotional health outcome, %				
Anger signs	–29.67	–9.32	–19.49 (–33.00, –5.50)	5,228
Hatred signs	–16.13	–12.16	–14.14 (–26.00, –1.90)	7,204
Aggressiveness	–46.59	4.79	–20.90 (–35.00, –6.60)	4,876
Physical health outcome				
Grip strength right hand, %	5.00	16.43	10.71 (–0.18, 22.00)	9,511
Grip strength left hand, %	21.90	33.33	27.62 (12.00, 43.00)	3,689
Body mass index, mean	0.53	–0.58	–0.003 (–0.87, 0.87)	299,172
Chronic pain				
SF-MPQ pain rating index, mean	–0.49	–0.01	–0.23 (–0.42, –0.04)	4,390
Quality of life				
Utility, mean	0.14	0.07	0.097 (0.02, 0.17)	10,508

CI: confidence interval; PTSD: post-traumatic stress disorder; SF-MPQ: Short-Form McGill Pain Questionnaire.

the cost of an extra unit or proportion of effectiveness, with values ranging from €5,724 to €131,686 for mental health outcomes, €4,876 to €7,204 for emotional outcomes, €3,689 to €299,172 for physical outcomes, and a value of €4,390 for chronic pain (Table II).

Cost-utility analysis

The results showed a reduction in functional impairment, indicating an increased health-related quality of life for both groups after receiving the intervention. On average, each participant in both groups gained 0.097 QALYs after receiving the treatment, with a mean cost of €1,019. The result showed the cost of obtaining 1 year of life in full quality/function was €10,508 (€1,019/0.097, 95% CI: €5,994–€35,138) for each participant (Table II).

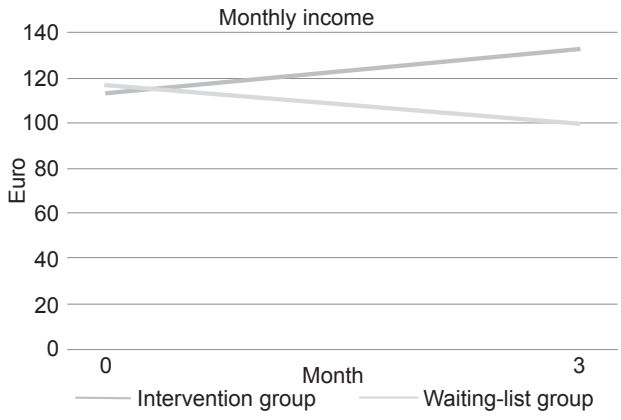

Fig. 2. Monthly income change comparison between the intervention group and the waiting-list group.

Partial cost-benefit analysis

Fig. 2 shows changes in the mean monthly income for the intervention group and the waiting-list group over the 3 months. The mean and standard deviation (SD) monthly income before treatment for the participants in the intervention group and the waiting-list group was €113 (SD €356) and €116 (SD €222), respectively. At the end of the 3-month treatment, the mean monthly income for the intervention group increased to €133 (18% growth rate), while for the waiting-list group without treatment it reduced slightly to €100.

To estimate the "return on investment" in this CBA model, it was assumed that the increase in healthy time for work and leisure for the intervention group would remain after treatment, so that the increase of €133 in the mean monthly income would remain at this level, while that of the waiting-list group would have remained at €116. After a little less than 5 years (57 months), the accumulated monthly increases in income would be equal to the extra cost invested in each participant in the intervention group (€868). Sensitivity analysis showed that to reach equality would take 53 and 59 months at discounting rates of 1% and 5%, respectively.

DISCUSSION

In Kosovo, as in many post-conflict countries, there are no policies for funding multidisciplinary rehabilitation for trauma-related disorders. There is a demand for academics and policymakers to provide substantial evidence that a multidisciplinary approach to rehabilitation, with its considerable cost and skill requirements, is a feasible option in post-war situations for

a traumatized population with comorbid chronic pain and mental disorders as well as social problems.

It is important for methods to be developed to provide such evidence. We conducted an economic evaluation of data from a RCT of a bio-psycho-social approach for rehabilitation carried out in 2012 in post-war Kosovo. According to the recent systematic review by Howard-Wilsher et al. (22), the available evidence from economic evaluations of rehabilitation for trauma or stress-related disorders comes predominantly from high-income countries. While there are a few cost-effectiveness studies on different treatment approaches among patients with PTSD or chronic pain targeting sexual/child abuse victims or ex-combatants/veterans, only 3 studies are highly relevant to our work (14–16). The importance of this case study is that it is the first economic evaluation of a multidisciplinary intervention for victims of torture or war in a resource-restrained post-conflict setting, using a different time-horizon and perspectives.

Our economic evaluation of the RCT data from Kosovo showed that the bio-psycho-social approach for rehabilitation was not cost-effective in terms of a gain of QALYs over a short time-period. The cost per QALY gained was more than 3 times the mean gross domestic product per person in Kosovo in 2012 (€8,424), which is the cost-effectiveness threshold suggested by the World Health Organization (WHO) criteria for decision-making (23). However, when the results are considered from a societal perspective, over a period of 4–5 years the intervention generated a net economic benefit in terms of an increase in employment and income, which could not only outbalance the intervention costs, but also contribute to a reduction in unemployment and a gain in labour productivity. The long-term point of view is important; the United Nations Development Programme "Crisis Prevention and Recovery Report" in 2008 (24) stated clearly that there is no example of long-term post-conflict recovery without a sustained increase in output per capita.

Implementing a multidisciplinary rehabilitation programme in Kosovo was costly; however, it was the first programme to combine several methods and to conduct a RCT to evaluate effectiveness and cost-effectiveness. The heavy costs were partly associated with the capacity building, monitoring and evaluation processes necessary for a new intervention. Multidisciplinary interventions in resource-limited settings are often hampered by poor coordination and administration, lack of qualified service providers and low adherence to treatment standards, which are all factors that help to explain the lack of evidence for successful multidisciplinary projects in these settings. To plan the intervention and prepare a RCT and train the local professionals during the planning stage of the Kosovo project, one epidemiologist and one psychotherapist from DIGNITY travelled to Pristina several times to build the capacity for necessary service provision and to establish the standard for monitoring and evaluation (i.e. review of recorded treatment sessions with an independent consultant). A large share (56.2%) of the total costs stemmed from costs for these 2 experts from Denmark. Jamison (25) showed that interventions that lead to higher-quality care processes not only increase individual and social welfare, but are also cost-effective in the long term. We assume that once new skills and competence have been developed, the costs of supervision, monitoring and evaluation for future interventions will be lower, and thus interventions will be more cost-effective. The development of new skills should also increase the general availability of professional services for the traumatized post-war population.

This study adopted a broad societal perspective rather than restricting itself to patients' or healthcare providers' viewpoints for assessing total costs and consequences on health and welfare. To identify the costs both inside and outside the healthcare sector, the indirect costs relating to loss of labour productivity contributed by individuals and family members during the treatment and follow-up period were included, as well as the direct costs generated by provision of treatment and use of healthcare resources. For example, we included costs borne by families, such as the cost of time spent when accompanying people for treatment and outcome assessment. On the other hand, the productivity gain indirectly linked with treatment, including increase in productivity and/or employment were also taken into account, both for the individual and for the family.

Our cost analysis is based on CBA and CEA, while CUA is used as an extension of CEA. Because of the *recurrent* oscillation between active and remitted symptoms and potential late effects following the intervention (26), we consider that economic evaluations of interventional strategies should incorporate a longer time-horizon when evaluating costs and consequences. Comparing multiple, diverse outcomes with CEA is challenging, yet vital, in the complex service delivery system using a bio-psycho-social approach, as the diverse effectiveness measures are presented in different domains and units (27). When all the domains are important, a comparison of individual outcomes using CEA can lead to conflicting implications concerning preferred policies. In this study, CEA showed wide variations in costs of outcome changes in different domains, while the CUA evaluated an overall generic outcome derived from the changes in QALYs for all the participants using a universal aspect of health and well-being. We therefore consider that CUA and CBA (28) are more suited to evaluating this rehabilitation

programme with its multiple outcomes, particularly as the study was originally designed as a trial of effectiveness of a combined intervention strategy and not to compare specific components within the intervention.

The types of outcomes and time horizon used in the CBA differed from those used in the CEA and CUA. For CEA and CUA, we used the final outcome measures at 3-month follow-up for both groups, both of which had, at this point, received the treatment. For the partial CBA, we used an intermediate outcome measure for modelling: the change in income 3 months after outset (month 0) for both intervention and waiting-list group. At this point (month 3) only the intervention group had received the treatment. This allowed us to calculate the net gain in productivity in the intervention group immediately after treatment. The individual level measurement was considered as proxy for overall labour productivity of the country, as a rising income reflects increasing competency in the labour market, which may be a sign of an increase in human capital and growth in labour productivity. The effect on employment and income is a particularly important outcome measure, since massive unemployment can put countries at risk of relapsing into violent conflict, post-conflict recovery policy must give priority to employment and encourage productive investment to prevent recurrence of conflict and lay the economic foundations for lasting peace and sustainable development (2).

In the current study, we only obtained basic information on participants' employment and monthly income rather than detailed information about the type of work done and the income paid, which is a major shortcoming in the use of such data. It is difficult for middle-aged and older people to keep a regular job in the labour-intensive market in Kosovo. At baseline, only 6 participants were in paid part-time employment. Nevertheless, by the end of the trial employment rate increased by approximately 15% for both groups and mean income of those who were in employment (most of them were employed part-time, but 2 had full-time jobs) also increased significantly (8).

One strength of the current study is that, thanks to the retrospective economic evaluation, which collected details of resources used from KRCT and DIGNITY financial reports, the true costs are accurately reflected. Furthermore, the RCT had a narrowly defined study population, a rigorous study design and strict quality control. The use of a waiting-list group, to which individuals were allocated randomly, ensured more precise results for causal inferences compared with a case-only design. The study covered a broad perspective including parameters associated with social functioning and labour force participation rather than focusing on symptoms. The effects were measured from multiple standpoints, while we adopted a societal perspective for cost analyses in CBA and CEA/CUA.

The results of this economic analysis are based on one project in a specific setting. However, the methodology could be applied to economic analyses of similar interventions. The conclusions could be generalized, to some extent, to other post-conflict settings with similar populations, especially in Balkan countries. However, since the available capacity and the cost of providing an intervention will vary widely, the parameters and values in the cost analysis will need to be altered to fit each local context. In our study, the resource use and cost data were presented separately, which allows policymakers to assess whether resources are available in their own setting and to apply their own prices for estimating the overall intervention costs (29).

A limitation of this study is that most mental, emotional and physical effectiveness indicators were converted to variables to standardize one proportion of the positive effect, but this excluded the pain rating index and BMI, since there are no data to suggest a cut-off value for pain, or whether the BMI criteria should be adjusted for Albanian ethnicity.

There are many potential benefits from a bio-psycho-social intervention like that implemented in Kosovo. We can expect that an increase in "healthy time" will result in a decline in the use of health and social services, as well as an increasing competence in the labour market, so that productivity and net income will increase. These positive effects will help to counterbalance the costs of an intervention. Many of these benefits could not be assessed in the current evaluation, because information from government sources on savings in health and social care costs, and unemployment subsidies, is difficult to obtain. The benefits reported in this study are limited to those measurable in terms of income, so the total benefit calculated is likely to be an underestimate. This study is also limited in that it only measured income change as productivity benefit over a 3-month period. This is a short time compared with the follow-up periods used in many evaluations of supported employment schemes. The long-term benefit needs to be assessed in future studies.

In conclusion, since no other RCT has examined a similar intervention to address comorbidity among victims of torture or war, this is the only information as yet available to guide decisions on interventions in post-conflict settings. Although the evaluation of this multidisciplinary intervention in a post-war setting concluded that the cost of an additional QALY exceeded the cost-effectiveness threshold recommended by the WHO for decision-making, this was over a short timespan. The intervention had great potential in enhancing employment and increasing labour productivity in the

longer term. When the local capacity to provide services is well established during the era of post-war reconstruction, this approach could achieve promising results in terms of treatment efficiency, and has the potential to achieve sustainable development goals in Kosovo.

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