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Sustainability of Behavioral Interventions: Beyond Cost-Effectiveness Analysis

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Abstract
Background Behavioral researchers need to ensure that successful interventions are sustained after the efficacy and effectiveness research concludes.
Purpose This article provides an overview of economic analyses that can be incorporated into behavioral medicine interventions to promote sustainability and recommendations regarding their use. We suggest that researchers interested in ensuring that their interventions are sustained include a budget impact analysis and identify the return on investment to the organizations or groups who must adopt and maintain the interventions at the conclusion of the study.
Recommendations We advocate the use of a thorough budget impact analysis that includes assessments of the change in costs and revenues for each organization over the short run and the monetary value of the intervention to the participants.
Conclusions By anticipating the types of economic information that will best promote sustainability, behavioral medicine researchers can better ensure the successful dissemination and translation of their interventions into sustained practice.

Keywords Sustainability · Behavioral interventions · Budget impact analysis · Cost-effectiveness analysis

Introduction

A primary goal of behavioral interventions is to improve the quality of life of people in need. When these interventions are developed and tested by a research team (rather than by a provider or government organization), the team faces the challenge of ensuring that their successful intervention continues after the study ends. Sustainability might involve finding partners (e.g., healthcare providers, organizations, and government agencies) who are willing to continue the program at the conclusion of the study. Ensuring that the intervention continues to be offered and is attractive to patients or participants requires partners to understand the value of the intervention to their organization and to have the types of information that they need to make a decision whether or not to sustain the program at the conclusion of the study. This is particularly important when the intervention requires additional funding, a change in how services and/or care are provided, or a shift in funding from one provider to another.

Recent years have witnessed significant advances in understanding how to engage providers and decision makers to ensure sustainability of behavioral interventions. Perhaps the most prominent framework for promoting sustainability of interventions in behavioral medicine is the *Reach*, *Effectiveness*, *Adoption*, *Implementation*, *and Maintenance* (RE-AIM) framework [1, 2]. For instance, a recent systematic review found 71 articles published between 1999 and 2010 in which the authors used the RE-AIM framework in the development of their intervention [3]. The emergence of journals such as *Journal of Translational Behavioral Medicine* and *Translational Medicine* is testament to the efforts that behavioral medicine researchers are making to translate research into policy and practice. Further advances have emerged through the evolution of the field of Implementation Science, which focuses on developing and evaluating methods to promote the integration of research findings and evidence into healthcare policy and practice [4–7].

There is also increasing recognition that cost considerations critically influence the sustainability of behavioral interventions. For instance, the RE-AIM framework emphasizes the importance of including the cost of the intervention and cost per participant as outcome measures [8]. Due in part to

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requests from government agencies such as National Institute for Health and Care Excellence (NICE) in the UK [1] and the Pharmaceutical Benefits Advisory Committee (PBAC) in Australia,[2] cost-effectiveness analysis has become, if not commonplace, then at least, not a rarity in behavioral medicine research.

Despite the increased emphasis placed on economic considerations, there are no clear guidelines to help researchers choose the type of economic analysis to incorporate into an intervention study. The purpose of this article is to provide an overview of the economic analyses that can be incorporated into behavioral medicine intervention studies and provide recommendations regarding their use. The goal is not to provide thorough guidelines for conducting cost, cost-effectiveness, or budgetary impact analyses (numerous books and articles provide excellent overviews of these analyses [9–12]). Rather, we seek to review the different types of economic analyses through the lens of sustainability. We argue that cost-effectiveness evaluations that take a societal perspective provide valuable information for decision makers from a societal standpoint, but they may not provide the most persuasive types of evidence for ensuring sustainability of behavioral interventions at the provider level. Instead, we advocate the use of a thorough budget impact analysis (BIA) that includes assessments of the net impact on each organization over the short run and the monetary value to the participants. By anticipating the types of economic information that will best promote sustainability, behavioral medicine researchers can better ensure the successful dissemination and translation of their interventions into sustained practice.

Cost, Cost-effectiveness Analysis, and BIA

Four types of economic evaluations are commonly used to assess the costs and benefits of health interventions [9, 10]; Cost studies, cost-effectiveness analyses, cost utility analyses, and cost benefit analyses. All types consider the direct and indirect costs of the intervention and healthcare usage but differ in their choice of outcome measurement. Cost studies report the costs associated with the intervention but do not report behavioral, health, or other outcomes. Cost-effectiveness studies compare the intervention and control programs using a single-clinical or self-reported outcome measure (e.g., change in markers reflecting immune function, estimated life expectancy, and reported satisfaction with care). Cost utility analysis reports changes in costs and quality-adjusted life years (QALYs). QALYs are a combination of the utility scores (such as EuroQOL 5D [13]) and life expectancy. Cost benefit analysis represents both costs and outcomes (e.g., monetary value of life year lost) in monetary terms, with the option with the highest net benefit being preferred.

Budget impact analyses (BIAs) focus on the financial consequences of adopting an intervention or new technology [14, 15]. Unlike economic evaluations, which is used to identify the most efficient way of providing a service (which is important for a global priority setting exercise), a BIA is used to summarize the net financial impact on an organization in a short period of time. Thus, a BIA can be distinguished from an economic evaluation in that it is concerned with the perspective of a single organization or funder (rather than society as a whole), the impacts of the intervention or treatment on that organization (rather than impacts on other organizations or funders), the impacts over a relatively short time horizon (e.g., 1 year rather than the long term), primarily direct health care costs (rather than also including indirect and intangible costs), and the net financial impact (change in revenues minus change in costs) [15]. As such, BIA can be seen as a complement to economic evaluations rather than as a substitute [14]. For the purposes of this paper, we will use the term "economic analysis" to include both economic evaluations and BIA.

When considering the type of economic analysis to conduct as part of an intervention study, it is important to start by asking the following: (1) Who will ultimately determine whether the intervention will be sustained if found to be successful and (2) what criteria will they use to make this decision? In some countries, decisions regarding whether to introduce a new intervention or pharmaceutical are made at the national level (e.g., National Institute for Health and Care Excellence (NICE) in the UK and the Pharmaceutical Board Advisory Committee (PBAC) in Australia). The agencies charged with making these funding recommendations often take a societal perspective by considering both the long-term costs and outcomes for all parties, and they often refer to the incremental cost-effectiveness ratio (ICER) when making their recommendation. Thus, if sustainability of the intervention requires convincing the agency of the net benefit to society, then researchers should consider conducting a cost-effectiveness or cost utility analysis as per recommended guidelines (e.g., NICE [16] and PBAC [17]).

If the intervention is unlikely to be funded by an agency or decision-making group that takes a long-term, societal perspective or if the intervention requires uptake by others (e.g., healthcare providers) who do not take this long-term perspective, then the researchers may need to conduct a BIA. To illustrate, consider the following scenario: A group of behavioral medicine researchers have a brilliant idea for how to improve the ability of women with breast cancer to cope with their diagnosis and treatment. Using the latest advances in

[1] National Institute for Health and Care Excellence. http://www.nice.org.uk

[2] Pharmaceutical Benefits Advisory Committee. http://www.pbac.pbs.gov.au/

behavioral medicine theory, they develop an innovative support and rehabilitation program; apply for and secure grant funding; sign up local primary healthcare providers (PHP) to refer patients; hire dynamic facilitators to run the sessions; and conduct a randomized, controlled trial to test the efficacy of their intervention by comparing the outcomes of women randomly assigned to the intervention with those of women receiving standard care. The findings strongly support the efficacy of the intervention: Relative to the women receiving standard care, women participating in the intervention report higher levels of satisfaction with their care; exhibit greater improvements in immune function following chemotherapy; and demonstrate greater adherence to screening, diet, and physical activity recommendations. In the longer term, the researchers might expect the intervention participants to have better health, fewer hospital visits, more primary care check-ups, and fewer days of missed work relative to their counterparts who received standard care.

Assessing the cost of this intervention would require the researchers to measure the costs of running the sessions, the cost of hospitalizations, the cost of primary care visits, and any additional costs to the participants (e.g., out-of-pocket expenses, time required to attend the sessions, and missed work; see Table 1). Several approaches can be used to estimate each of these costs. For instance, the overall cost of the intervention can be assessed using a resource-based approach whereby the researchers record the number of "units" of resources associated with delivering an intervention (e.g., number of hours spent by facilitators to prepare and conduct the sessions and number of meeting rooms), apply a common price or cost to each unit (e.g., $35 per hour for a facilitator and $100 per rental fee for room), apply a standard overhead rate (e.g., 50 %), and then combine these costs to determine the total cost of the intervention. A comparison of the total costs with those of the comparison group provides an estimate of the difference in costs over a finite period of the intervention (e.g., 12 weeks) and a longer-term follow-up period (e.g., 1 year).

This approach to estimating the cost of the intervention is consistent with the recommendations of the RE-AIM framework (e.g., *Implementation* guidelines [2]). When conducting a BIA, however, an additional factor to consider is the change in revenue for each provider. This might include changes in the amount of reimbursements to the providers, including payments for additional stays or visits, changes in participants' earnings resulting from changes in amount of missed work, or other revenue-generating items. This information when combined with the additional cost of providing services provides evidence of the net financial implications to each provider from implementing the program.

The net cost to each provider will depend on both the change in health usage and the funding model. To illustrate, suppose the research team, using a resource-based costing approach, determines that the support and rehabilitation intervention costs $120 per person, reduces the average number of hospitalizations from 4.5 days per person to 4.3 days per person, increases the number of PHP visits (for prevention services) from an average of 3.2 visits per person to 5.1 visits per person, and reduces average out-of-pocket costs from $85 to $65 ("Cost row" in Table 2). Using an "average" or typical hospital bed day cost of $1,000 per day and an estimated cost of a PHP visit of $75 per, the researchers conclude that the intervention led to a savings of $200 in hospitalization costs, an increase of $143 in PHP costs, and a reduction of $20 in out-of-pocket expenses per patient.

The calculation of the overall financial impact of the intervention thus includes the change in both costs and revenues. In practice, differential impacts on providers are common, with some providers (e.g., hospitals) seeing an increase in net revenue from the intervention and others (e.g., PHPs) incurring a greater cost. If, in the example above, all healthcare costs are paid directly by the patient or insurance company (fee for service), then the net impact of the intervention on hospitals and PHPs is lower revenues and expenditures, with the savings going to the participant or insurance company (a total savings of $77, reflecting $200+$20–$143, in Table 2). On the other hand, if the hospital and PHPs receive a lump sum for care of the patients (a capitated payment system), then the change in usage does not impact

Table 1 An example of cost categories associated with a hypothetical support and rehabilitation intervention for women with breast cancer

Type	Description	Examples of cost approaches
Intervention	The staff time and facilities required to run the program	Payments to facilitators, rent on facilities, overhead costs
Hospital	Emergency room visits, inpatient care, outpatient care	Hospital charges, government reimbursements for diagnostic related groups, days in hospital at standard bed-day rate
Primary care	Visits to primary healthcare providers	Charges per visit, amount of time per visit times standard payment rate
Missed work	Number of days off work due to illness	Number of days missed times the average daily earning
Out-of-pocket expenses	Over-the-counter medications, travel costs, home help	Amount paid for medications, standard cost per mile of travel, amount paid to a home aide
Participant time	Time spent going to and from sessions, time spent seeking information from other sources	Number of minutes traveled, in sessions, and/or searching for support through other means (e.g., internet) times average daily earning

Table 2 An example of cost and outcomes from a hypothetical support and rehabilitation intervention for women with breast cancer

		Control	Intervention	Difference
Cost	Intervention	$0	$120	$120
	Hospital	$4,500	$4,300	($200)
	Primary healthcare providers	$240	$383	$143
	Other	$85	$65	($20)
	Total (12 month)	$4,825	$4,868	$43
	Long term per year	$2,500	$2,400	($100)
	Total (over lifetime)	$17,692	$19,568	$1,693
Outcome measures	Immune function			0.6 points=(3.8−3.0)−(3.2−3.0)
	Baseline	3.0	3.0	
	12 months	3.2	3.8	
	SF-36			5 points=(87−79)−(83−80)
	Baseline	80	79	
	12 months	83	87	
	Difference	3	8	
	Willingness to pay	$0	$110	$110
	Life expectancy from baseline	8.25	9.5	1.25 years
	Utility scores			0.09 utils per year=(.78−.68)−(.70−.69)
	Baseline	0.69	0.68	
	12 months	0.70	0.78	
	Difference per year	0.01	0.10	
	QALYs	0.08	1.80	1.70 QALYs=1.80−.08
Incremental cost effectiveness ratio	Immune function	$2,822 per change in immune levels		
	SF-36	$339 per one point change in SF-36 scores		
	Life years gained	$1,354 per life year gained		
	QALYs	$986 cost per QALY		

SF-36 is a measure of overall quality of life. Willingness to pay is a measure of the amount an individual might be willing to pay for an intervention. Utility scores are measured on a scale of 0 to 1, with "1" referring to "full health." QALYs refer to quality-adjusted life years and are calculated using utility scores and the amount of time in each that utility state. CEs refer to "cost-effectiveness," with the ICER using being the difference in total costs between control and intervention divided by the difference in outcomes between control and intervention

the revenue that they receive. In this case, the hospitals would benefit from having their costs reduced by $200 with no change in revenues, while the PHPs would lose $143 per patient due to the increases in uncompensated care.

The discussion to this point has focused only on costs and revenues, with no consideration of the outcomes. Suppose researchers found that the intervention led to an increase in immune function (0.6 points; "Outcome measures" row in Table 2) as well as improvements in quality of life as reflected by an average increase of 5 points on the Short Form-(36) Survey (SF-36; [18]), an average gain of .09 utils per year [(.78−.68)−(.70−.69)] on the EuroQOL 5D [13], and an increase of 1.70 QALYs. Using only the change in total health care costs over the lifetime (e.g., $2,500 per year of life compared with $2,400 per year of life, with future cost discounted at annual rate of 5 %) to estimate the change in lifetime costs ($1,693=$21,153–$19,460) would suggest a cost-effectiveness ratio of $2,822 per change in immune function, 339 per one point change in SF 36, and $1,354 per life year gained. The cost utility ratio would incorporate changes in utility scores and life expectancy (e.g., average of 9.5 years compared with 8.25) to estimate the change in QALYs over the remaining lifespan, for a cost per QALY ratio of $986. Finally, if the individuals were charged the average willingness to pay (WTP) for the intervention, it would nearly cover the cost of the intervention ($120–$110).

How do the decision makers use this information to address the question of whether the intervention is worth the cost? The most straightforward interpretation involves the cost benefit analysis since both outcomes and costs are in monetary terms. The problem with cost benefit analysis, though, is that it can be difficult for people to place meaningful monetary values on some health outcomes, such as the health of a child or a reduction in pain.

The second option is to conduct a cost-effectiveness analysis using clinical outcome measures and then make a decision based upon the ICER (bottom of Table 2). This option has the advantage of being easier to assess (e.g., immune levels), but it has the disadvantage of being harder to interpret. For instance, providers and decision makers might be challenged

to interpret whether a cost of $2,822 per one point change in immune function is "worth it."

The advantage of using a cost per QALY as a measure of health outcomes is that QALYs can be compared across different domains (e.g., behavioral interventions, surgical procedures, and drug treatments) and thus act as a single currency. Norms have arisen regarding the level of cost per QALY that is deemed worth it, and researchers often examine the implicit thresholds used by government organizations when making funding decisions [19–21]. For example, the issue of whether to offer Herceptin to women with breast cancer has been a controversial topic due in part to the high cost per QALY ratio associated with its use [22].

Outcome Measurement for Behavioral Interventions

In principle, cost-effectiveness and cost utility analyses provide more thorough and comprehensive basis for comparison relative to a BIA. By incorporating long-term costs, short-term costs, outcomes, and (for cost utility analysis) change in life expectancy in a single measure, they provide evidence to an organization's decision makers as to whether the cost of an intervention is worth the resulting health improvements. In contrast, a BIA only answers the question of whether the intervention saves or costs money without considering the outcomes.

From a sustainability standpoint of behavioral interventions, however, cost-effectiveness and cost utility analyses might not be as useful as a BIA when addressing the concerns of participating healthcare providers or organizations. The underlying assumption of cost-effectiveness or utility analysis is that there is a single decision maker who will care about the long-term, societal costs and benefits. While providers and other decision makers might care to some degree about information provided by cost-effectiveness analysis (e.g., long-term costs and benefits), they are likely to be more interested in understanding the net impact on their organization of implementing the program. Given the large number of potential uses of their funds, requests to continue funding a behavioral intervention must compete internally against other options such as new medical devices, costly surgical procedures, or increases in employee salaries. In our hypothetical behavioral intervention evaluation, for example, the cost utility ratio combines differences in the long-term costs and benefits of the intervention and control group into a single measure. While this global view may be informative in terms of whether a given behavioral intervention is "worth the expense" from a societal perspective, it does not factor in the distribution of costs and benefits across organizations. In our hypothetical intervention evaluation, the savings to the hospital ($200) may outweigh the additional cost to the PHPs ($143), but there may be no agreement to redistribute money between the parties or make side arrangements to redistribute the funds. Such arrangements would require a high degree of coordination and cooperation that, in practice, is unlikely to exist. This calculation does not include the cost of providing the intervention ($120). Even if one party (hospital) can be persuaded to fund the intervention indefinitely, it will reduce their overall financial gain and lessen any potential transfers to other providers.

The value of cost-effectiveness analyses of behavioral interventions is further challenged by the types of outcomes that are typically used to evaluate behavioral interventions. Decision-making bodies (such as NICE) and health policy makers tend to favor the use of QALYs since it provides a single measure that can be compared across different decision domains. Unlike more domain-specific outcomes such as physical functions (e.g., the Bartel Index) or general quality of life measures (e.g., the SF 36), QALYs can be compared across different areas of medical decision-making (e.g., to compare the benefits of a behavioral intervention for women with breast cancer with benefits of a surgical procedure for a cardiac condition). Unfortunately, previous studies have concluded that utility measures and QALYs are not sensitive to changes in factors typically targeted by behavior medicine researchers (e.g., [23]). Consequently, behavioral intervention evaluations that demonstrate changes in domain-specific outcome measures (e.g., emotional role functioning on the SF 36) might not provide decision makers with sufficiently convincing evidence to persuade them to fund the program, while the more commonly accepted measures (QALYs) might not capture the impacts of the intervention.

Behavioral researchers interested in promoting the sustainability of their interventions should therefore begin their trial by identifying the types of outcomes that are valued by the organizations that will sustain the program upon completion of the trial (e.g., satisfaction levels, immune function, improvements in overall quality of life, and QALYs). By focusing on the outcomes that organizations value, the research team can help ensure that they are providing the information that will enable the organization to determine whether beneficial changes in outcomes are worth the additional expense (i.e., essence providing a personalized cost-effectiveness study). If the outcome measure most directly relevant to organizations is not likely to be impacted by the intervention (e.g., life expectancy), then the researcher might consider measuring the monetary benefit to the patient. An extensive literature in economics focuses upon assessing an individual's willingness to pay for intangible or difficult-to-measure assets such as environmental quality or amenities [24], although the field is not without controversy (e.g., [25]). Traditionally, willingness to pay is assessed by asking participants how much they would be willing to pay for (or to accept the removal of) some amenity such as clean air or biodiversity. In the present example, the inclusion of a willingness-to-pay question would provide information in monetary terms about how much participants value the support and rehabilitation program.

Willingness-to-pay questions have the advantage of being straightforward, but they are often criticized as being artificial [26]. Over the past decade, health economists have increasingly favored a related way of measuring value: discrete choice experiments (DCEs; [27]). The basic methodology for DCEs is to first identify the factors that are important to individuals (e.g., time of sessions, cost of sessions, provision of social support, skills training for managing fears of recurrence, and disposition of facilitator) and then present individuals with a series of hypothetical choices between two programs that vary on these attributes (or between a program with specific attributes and no program). DCEs enable researchers to identify the relative importance of the factors to participants as well as the amount that individuals are willing to pay for the program.

Regardless of the method used to assess the value to participants, the end result can be that researchers can report the potential monetary value of the intervention for users. This information might be useful to the sustaining organization because it represents the perceived value of the service to the patient in a currency that the organization can understand. It can also be used by the organization when determining whether there is a business case for recouping the costs of the intervention by charging patients. In countries with active private markets for healthcare services, healthcare providers and organizations often need to raise money for their services directly. In these cases, information on the WTP of individuals can provide a useful starting point for developing a business case for sustainability.

Recommendations for Economic Considerations of Behavioral Interventions

To promote sustainability, we suggest researchers to follow four steps (summarized in Box 1).

Box 1: Recommendations for ensuring economic sustainability of behavioral interventions

1. Engage with the relevant organizations at the start of the intervention trial
(a) Identify provider(s) who might take up intervention at the conclusion of the trial
(b) Identify the factors of primary interest to the organization
2. Conduct a cost analysis to estimate the net cost of the intervention
(a) Prior to introduction of the intervention, identify current revenues and costs to each organization of delivering related services
(b) At the conclusion of the study, estimate the change in revenue and cost of delivering the service to each provider
(c) Estimate the net change in costs and revenues of delivering the intervention
3. Estimate the value of the intervention to the participant
(a) Estimate the participants' willingness to pay for the intervention using contingent valuation methods
4. Identify the organization's return on investment
(a) Estimate the *return on investment* to each health care provider and organization involved with or influenced by the intervention

Step 1 Identify the sustaining organization at the start of the intervention

First, we recommend that researchers identify and engage with all individuals and organizations impacted by the intervention and especially the entity that might implement and sustain the intervention at the conclusion of the trial. This step is consistent with the RE-AIM recommendations [2] and the recommendations from proponents of participatory action research [28, 29]. Because the researchers will need to access information on revenues and costs, it is critical to establish a trusting partnership. Assessing the impact on each organization requires understanding the factors that are important, measuring the costs and revenues of the intervention prior to implementation and at the conclusion, and then assessing how the operations have changed as a result. Researchers should adhere to the guidelines of participatory action research by engaging with the organization during the development phase and ensuring that the study collects the type of information that the organization needs, including the extent to which the intervention changes or disrupts its current operations.

Step 2 Conduct a BIA

Assuming that the organization(s) agrees to allow the researchers to measure changes in costs and revenues over the course of the intervention, the next step is to conduct a BIA to assess the net financial impact on each organization. Unfortunately, most organizations will not routinely collect the type of information needed to identify the costs and revenues of the service provided by a behavioral intervention. For instance, in the absence of a support and rehabilitation program for women with breast cancer, a participating PHP might provide support as part of regular consultations, and nursing staff might respond to patient inquiries and concerns. Since the PHP practice is unlikely to record the number and duration of such contacts as part of their regular record keeping, the research team will need to assess these factors prior to the introduction of the intervention.

This exercise requires the use of a research design in which these organizational features are assessed prior to and following the initiation of the intervention. This study design feature goes beyond the standard design of comparing intervention and control participants in terms of changes from baseline to follow-up time points. While such intervention-control condition comparisons evaluate intervention effects while controlling for patient characteristics, they do not address changes in organizational or provider practices or outcomes. Because it is often

unrealistic to randomize both patients and organizations, it might be necessary to measure the process by which care is delivered both prior to the implementation of the intervention and at the conclusion within each organization. In the case of a support and rehabilitation program for women with breast cancer, this would require measuring the amount of time spent by PHPs and their staff addressing questions or concerns that might be dealt with in the program and the number of visits that were motivated by such concerns. Researchers must therefore use multiple approaches to gather this information, including interviews with key staff to develop process maps showing how patients are currently receiving the services, analyses of medical records or other data routinely collected during patient visits, and use of daily diaries of key individuals in the organization. Box 2 shows the basic approach to assessing the cost and revenues associated with the intervention.

Box 2: Conducting a budget impact analysis

1. Characterize how the service is delivered and the revenues that the organization receives prior to the start of the study. This may require the development of process maps, time and motion surveys, activity logs, and use of resource-based costing approaches. The information can be augmented and verified with routinely collected practice data such as clinic visits, reimbursements, and patient charges.
2. Characterize how the service is delivered and the revenues that the organization receives at the conclusion of the study.
3. Estimate the change in costs and revenues for each organization.
4. Identify other barriers to implementing the intervention from the organization's standpoint.

Step 3 Estimate the value of the intervention to the participant

If the outcome of the BIA (step 2) suggests that the intervention saves the organization money and improves patient outcomes, then the likelihood that it will be adopted and sustained rises dramatically. If the results suggest that the intervention is beneficial but requires additional costs, however, then providers or organizations who must sustain the intervention will want to know whether the additional costs are worth the benefits.

While details regarding how best to conduct a discrete choice study can be found elsewhere (e.g., [30]), the basic method is to identify the choices that individuals will make (e.g., whether or not to participate in an intervention or a choice between two or more interventions), identify the factors about that choice environment that are important to individuals (e.g., location, outcomes, cost, and distance to travel), give study participants a series of choices of interventions that differ on the levels or values of these factors, and then calculate the implicit value or willingness to pay for each of these different attributes. Using this information, researchers can deduce the value that individuals place on the intervention being offered and the value if the intervention was delivered in a different way. Thus, this method provides the research team and the organization targeted for sustaining the intervention with information on how much people value the current intervention and how it might be improved to be more valuable in the future.

Step 4 Return on investment

The final recommendation is to work with the organization to understand its return on investment (ROI) from continuing the intervention. ROI is a general term that can encompass cost-effectiveness analysis, cost benefit analysis, net present value analysis, and other techniques aimed at assessing the benefits (returns) and cost of an investment (see National Institute for Health and Care Excellence [16] for an overview). The use of the more general term (as opposed to cost-effectiveness) reflects the need to tailor the analysis to the needs of the organization rather than to the more narrow criteria associated with cost-effectiveness analysis. For instance, NICE recently reviewed its use of cost utility analysis for measuring the benefit of public health interventions and identified the demand from organizational decision makers for information other than cost utility analysis, including net present value and cost consequences analysis and sensitivity analysis to help the organizations understand the robustness of the results to areas of uncertainty [16].

To promote sustainability, researchers should consider combining the financial and outcome information to assist the organization in making what is often a business decision. Even though this is listed as the final step, the process of determining the types of outcomes to consider in the ROI should start at the beginning of the project. In addition to identifying the type of information to collect, this process will provide a context for all parties to discuss from the outset what information will be needed to make a decision about whether to sustain the intervention. While this process does not guarantee that the intervention will be sustained, it does serve to ensure that researchers are collecting the right types of information and that organizations understand that if the intervention is found to be successful, they will be asked to sustain it when the trial concludes.

Conclusion

For a behavioral intervention to be sustainable, it must meet the needs of the targeted population (so that uptake is high)

and have an organization or group willing to continue offering the intervention into the future. While economic considerations are not the only or even the most important factor to consider when planning how to sustain behavioral interventions, a failure to consider the financial impacts on each organization could derail efforts to sustain the interventions. In this article, we consider the types of economic analyses that will provide organizations with the information they need when deciding whether or not to sustain an intervention. We argue that a BIA that estimates the net financial impact on each party, the timing of benefits and costs, and the factors that organizations will consider when determining the worth and monetary feasibility of a program can help to ensure the sustainability of an intervention. While it is possible that the organizations might value a cost-effectiveness or cost utility analysis, we encourage researchers to consider the possibility that the organizations might also value an analysis that identifies the net financial impact on their organization, the value that participants will place on this intervention (including a monetary value), and their organization's return from investment from adopting the intervention.

Previous studies have argued for more rigor in assessing the cost of behavioral medicine interventions (e.g., [31]) and have questioned the extent to which cost-effectiveness analysis is useful for decision makers [32–35]. Proponents of the RE-AIM framework have explicitly advocated for inclusion of cost information as a component of evaluations [2], and they have provided examples of studies that have included cost analyses as part of the return to investment [5]. The RE-AIM recommendations are consistent with the recommendations proposed here, and cost-effectiveness analysis has been and will continue to be extremely important to decision makers and policy makers interested in understanding the optimal decisions from a long-term, societal standpoint [36]. The primary point of this article is that, from a sustainability perspective, the perspectives of the organizations that must adopt and maintain the interventions are critically important. Organizations are likely to be more interested in BIA and ROI analyses that reveal the net impact on their organization than in cost-effectiveness or cost utility analyses. While this might seem to be an uncontroversial point, the implications for behavioral medicine researchers in terms of how they conduct their intervention research and the type of information they collect are likely to be substantial.

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