

Translating Research to Practice: Taking the Next Step to get Children Diagnosed with Cancer Moving

Daeggelmann J^{1*}, Wurz A², San Juan AF³, Albinati N², Bloch W¹ and Culos Reed SN^{2,4,5}

¹Department of Molecular and Cellular Sports Medicine, German Sport University, Germany

²Department of Kinesiology, University of Calgary, Canada

³Department of Health and Human Performance, Polytechnic University, Spain

⁴Department of Oncology, University of Calgary, Canada

⁵Department of Psychosocial Resources, Tom Baker Cancer Centre, Canada

***Corresponding author:** Julia Daeggelmann, Department of Molecular and Cellular Sports Medicine, German Sport University, Institute of Cardiology and Sports Medicine, Am Sport park Mungersdorf 6, 50933 Cologne, Germany, Tel: 004922149825450; Email: j.daeggelmann@dshs-koeln.de

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Abstract

Most research-based physical activity (PA) interventions show that children diagnosed with cancer experience health-related benefits during the intervention period. However, translating these interventions into practice is uncommon. To better understand if/how researchers translate their PA interventions to practice, we identified 65 researchers who had published research manuscripts/conference abstracts detailing PA interventions for children with cancer. Most authors reported their PA intervention was not translated into practice due to financing constraints and low adherence rates during the study period. Of those who did translate, strategies to overcome commonly cited barriers were provided. We can conclude that PA interventions are rarely translated to practice, as doing so is resource-intensive and requires concerted efforts from multiple stakeholders. Findings underscore the complicated nature of knowledge translation and raise questions about whose responsibility it is to move evidence to practice.

Keywords: Exercise; Fitness; Sports; Knowledge Translation; Cancer; Pediatrics; Supportive Care

Abbreviations: PA: Physical Activity.

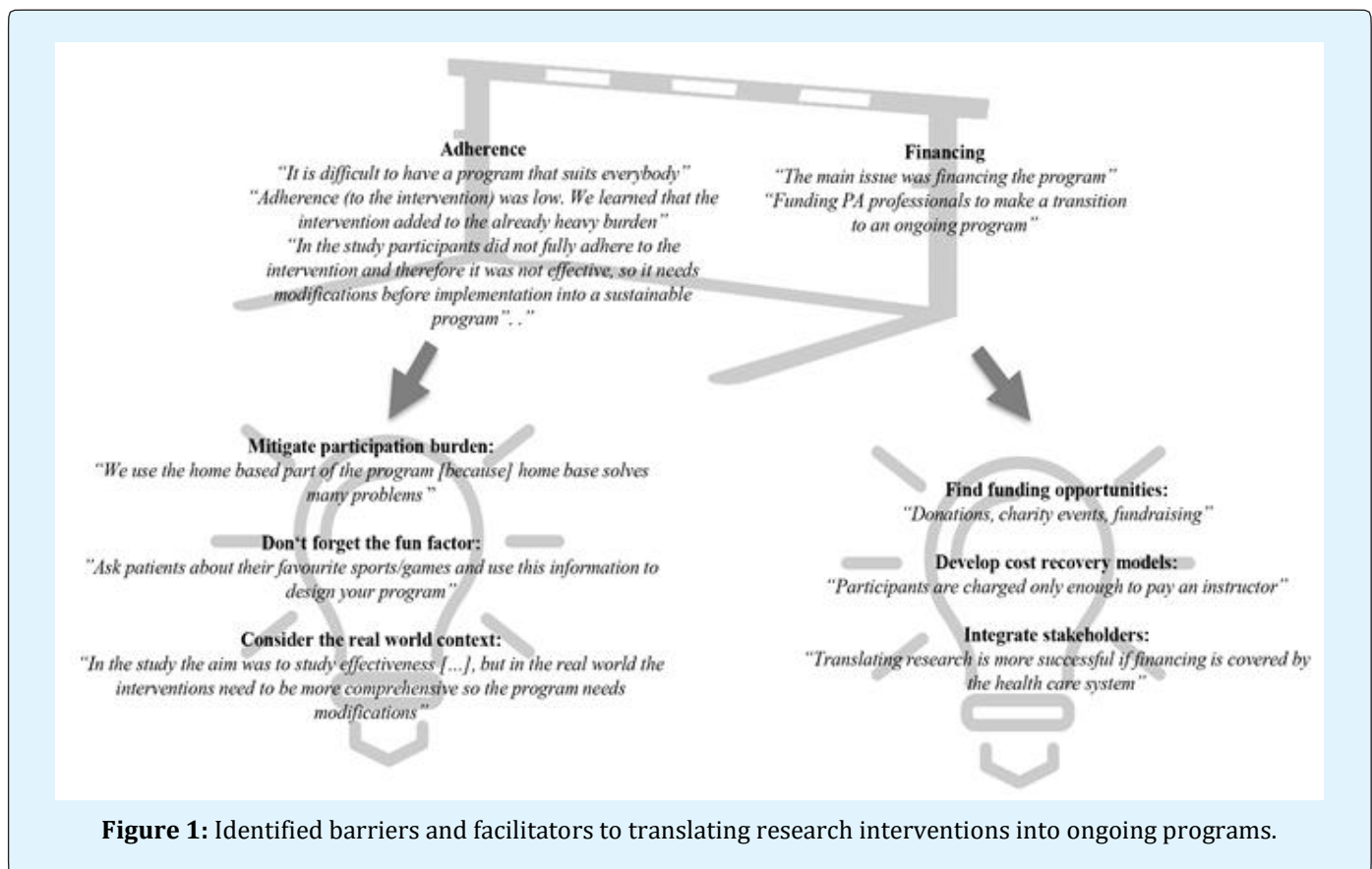
Introduction

An accumulating body of evidence suggests that research-based physical activity (PA) interventions can offer children diagnosed with cancer benefits [1-4]. Despite this, efforts to translate PA interventions to practice are rarely described [see 5, for a notable exception] potentially contributing to a growing knowledge-to-practice gap in pediatric oncology. Researchers may be able to lead translation efforts, yet, whether researchers are translating their PA interventions into practice remains unknown. Therefore, we sought to ascertain if/how PA interventions are translated into practice in an effort to offer practical insights and guidance for those seeking to translate their research.

Methods

As part of a larger environmental scan [6], we conducted a systematic literature review following

established guidelines [7]. Citations were identified through searching five electronic databases, and screening was conducted according to established eligibility criteria [6]. Upon confirming inclusion, the corresponding author(s) of the identified citations were contacted and asked whether their intervention was translated into practice. Based on authors' response, one of two sets of open- and closed-ended follow-up questions were sent. These questions either asked for more information about the translation process or reasons for not translating, as appropriate. PA intervention information was extracted from the citation. A standardized data charting document was used to collate information from the identified citation and from authors' responses. Qualitative content analysis was used to analyze authors' responses to the open-ended questions [8]. Brief quotes to illustrate key findings were selected and are presented in Figure 1.



Results

Sixty-five authors were identified and 49 were contacted. Sixteen authors could not be contacted. Of the 49 authors contacted, 41 responded to the emails. Based on author responses, six programs were included as PA interventions that were translated and 20 were included as PA interventions that were not translated. Fifteen authors did not receive the second email because they did not respond to the first email ($n=2$) or were unable to provide the required information (i.e., research was ongoing $n=2$; author was no longer in charge of the PA program $n=4$; program was developed prior to research $n=7$).

PA Interventions that were translated

Five of the six authors who translated their PA intervention responded to the questions. Details related to the research-based PA interventions and subsequent translated PA programs can be found in Table 1. Similar to the intervention from which it was translated [1, 3, 9-

15] programs are being offered in either the hospital or the community [1,5,9-14]. PA professionals lead or supervise most PA programs, with one exception, wherein participants receive PA evaluation sessions with a physiotherapist but perform their PA program unsupervised at home. Programs are offered to any child diagnosed with cancer across the cancer trajectory and medical clearance is required to participate in four of the programs. For one program this is only required for children on-treatment. Two programs are open to support persons (e.g., friends, siblings).

There were no major changes in the type of PA during the translation process. However, four programs reduced the frequency and/or length of each PA session, three authors mentioned modifications in the duration of the PA program, one developed a cost recovery model and the program only runs if there is sufficient demand for classes and one author reported that the PA program was integrated into standard care. Two programs removed either the supervised or home-based part (Table 1).

Study Author, Country (Corresponding Author)	Research-based PA intervention as described in identified citation	Changes made in translation process	PA program as described in response to email	PA program participants as described in response to email
Beulertz, et al. [3] Germany, (Daeggelmann J)	Setting: in-hospital Supervised: yes (sports therapist) Frequency: 1x/wk, 60min Duration of intervention: 6 months Type of PA: group-based - aerobic, strength, coordination exercises and games	Duration of program not limited	Setting: in-hospital Supervised: yes (sports therapist) Frequency: 1x/wk; 60min Duration of program: Open-ended Type of PA: group-based-aerobic, strength, coordination, exercises and games	Diagnosis: mixed Phase of treatment: mixed (during maintenance treatment and off-treatment) Age: 4-18 yrs Requirements: medical clearance and written informed consent Support persons: siblings/friends
Fiuza Luces, et al. [9] San Juan, et al. [10-12] Soares Miranda, et al. [13] Spain (Lucia A)	Setting: in-hospital Supervised: yes (experienced professional) Frequency: 3x/wk, 60-120min Duration of intervention: 8-49wks Type of PA: individual -aerobic (cycle ergometer) and strength training (resistance	Integration into standard care; duration of exercise sessions reduced	Setting: in-hospital Supervised: yes (experienced professional) Frequency: 3x/wk, 60-90 min Duration of program: during inpatient treatment Type of PA: individual - aerobic (cycle ergometer, treadmill, arm cranking, games) and strength training (resistance machines or dumbbells)	Diagnosis: mixed Phase of treatment: on-treatment (including first year of maintenance treatment) Age: 4-18 yrs Requirements: medical clearance and informed consent Support persons: none

	machines or dumbbells)			
Takken, et al. [14] Netherlands (Takken T)	Setting: mixed (physiotherapy clinic, home-based) Supervised: mixed (physiotherapist/unsupervised) Frequency: 4x/wk; 11-45min Duration of intervention: 12 wks Type of PA: individual - aerobic, strength, and flexibility exercises	Removal of supervised part thus changes in setting and supervision; changes in frequency/duration of exercise sessions and duration of program	Setting: predominantly home-based Supervised: no (only evaluation sessions with physiotherapist) Frequency: 2x/wk, 15-30 min Duration of program: as long as necessary, usually 3-6 months Type of PA: individual-aerobic, strength, and flexibility exercises	Diagnosis: mixed Phase of treatment: off treatment Age: 6-18 yrs Requirements: medical clearance Support persons: physiotherapist
Wiskemann study protocol, see Braam, et al. [1] Germany (Wiskemann)	Setting: mixed (in-hospital and home-based) Supervised: mixed (sports therapist and unsupervised) Frequency: 3-5x/wk, 15-30min Duration of intervention: during inpatient treatment Type of PA: individual - aerobic, strength, and balance training (partly console-based)	Removal of home-based part, thus changes in setting and supervision; frequency reduced	Setting: in-hospital Supervised: yes (sports therapist) Frequency: 2-3x/wk; 30min Duration of program: during inpatient treatment Type of PA: individual - aerobic, strength and balance training (partly console-based)	Diagnosis: mixed Phase of treatment: on-treatment Age: 5-21 yrs Requirements: medical clearance Support persons: none
Wurz, et al. [15] Canada Culos-Reed NS	Setting: community-based Supervised: yes (trained yoga instructors) Frequency: 2x/wk, 60min Duration of intervention: 8 weeks Type of PA: group-based - gentle yoga	Cost recovery model implemented; program only runs when there is sufficient demand or interest; frequency reduced and duration of program extended	Setting: community-based Supervised: yes (trained yoga instructors); Frequency: 1x/wk; 60min Duration of program: 12 weeks Type of PA: group-based - gentle yoga	Diagnosis: mixed Phase of treatment: mixed (on/off treatment) Age: 5-18 yrs Requirements: screened by certified exercise physiologist, medical clearance only for those on treatment Support persons: siblings/friends

Table 1: Description of research-based PA interventions, changes made during translation, and resultant ongoing PA programs.

Min: Minutes; PA: Physical Activity; Wk(S): Week(S); Yrs: Years

As shown in Figure 1, the main barriers mentioned by authors who successfully translated their interventions were related to financing and low recruitment/adherence rates during the PA intervention. To overcome these barriers, authors reported using a variety of funding models, often securing funding from private donors, fundraising/charity events, and institutions/government. As well, authors reported engaging in extensive promotion efforts in order to enhance recruitment rates and modified the PA intervention to ensure adequate adherence (i.e., lessening the number of sessions/week or duration to reduce participation burden).

PA Interventions that were not translated

Sixteen of the 20 authors who indicated they did not translate their research responded to the questions. Eleven stated that they had not planned to translate their research intervention and five reported they were unable to successfully translate their research. The main reason authors did not translate their intervention was because there were no resources to continue the program beyond the intervention period. Moreover, low adherence rates during the PA intervention, non-significant findings, and a range of miscellaneous reasons were also provided (e.g., authors moving institutions and being unable to sustain the PA intervention; see Figure 1).

Discussion

In an effort to understand if/how research interventions are translated into practice, we reviewed the current literature. Findings suggest that only a small proportion of interventions were translated. The authors who intended to translate and were successful in their efforts offered brief insights into practical ways to overcome some barriers to translating research, while those who were unsuccessful underscored challenges that need to be considered. Financing constraints and low adherence rates were common barriers identified. Bolstering funding via concerted efforts and modifying the design of the intervention were necessary to overcome these barriers.

A main finding from this study was that most authors did not translate their research because it was never their intention to do so. They conducted an intervention to examine a specific outcome, and thus the research was not designed with factors to address external validity and generalizability (including implementation into practice). This raises important questions about (a) the design of research without consideration of knowledge translation, (b) current research funding paradigms, and (c) whose

responsibility it is to translate PA interventions. On the one hand, researchers may be ideally suited to translate their interventions as they are up-to-date on the best available evidence and designed/conducted the intervention. As such, they have insight into what aspects, if any, should be modified to ensure participant engagement. On the other hand, translating research to practice is often time- and resource-intensive. One possible strategy to mitigate this burden is to provide the minimal PA prescriptions needed for change [16]. Indeed, less frequent PA interventions (e.g., 1-3 days/week) have not only been shown to be effective [3], but have even been reported as a key to the ongoing sustainability of PA programs for children diagnosed with cancer [3].

Moreover, the importance of collaborative and coordinated approaches was highlighted [17]. Those researchers who were successful in translating their intervention described concerted and ongoing engagement with key stakeholders. It may be prudent for researchers to establish and foster relationships with individuals in the local healthcare system (e.g., healthcare providers, administrators) and in the community (e.g., organizations) from study inception onward. As healthcare systems, particularly healthcare providers, have been shown to play a key role in PA promotion [18], fostering productive healthcare and allied healthcare providers' relationships might be ongoing education and systems that enable them to easily and efficiently refer to PA interventions/programs [19]. Among older adult cancer survivors, similar ideas have been suggested. Notwithstanding the importance of fostering relationships, it is likely that many researchers may have limited experience engaging stakeholders and translating knowledge. Thus, to move research to practice, it may be important to encourage interdisciplinary collaborations between pediatric oncology/exercise researchers and specialists in knowledge translation and implementation science. This may enhance the likelihood of knowledge translation upon study cessation and could serve to spread out or share the load/effort required to translate research [16]. Moving forward, more efforts to identify how researchers and stakeholders can effectively share responsibility for moving evidence to practice is necessary.

Notably, all authors who successfully translated their research noted that modifications to their PA intervention were necessary, underscoring that highly-controlled trial, which are necessary to establish efficacy, may not be conducive to translational efforts. Thus, more practical/pragmatic trials that consider the complexity of

the real world are necessary [16,17]. Within the context of pediatric oncology, including more heterogeneous samples at different stages of the cancer trajectory would increase generalizability and the pool of potential participants. Further, highly-controlled PA interventions are often costly, which could further hinder effective translation and sustainability efforts [17]. In this regard, researchers may wish to keep the resources in mind that will be required to maintain their intervention and include translation budgets when applying for funding [20,15].

Finally, it should be noted that translating PA interventions is only one strategy to bridge the knowledge-to-practice gap, as practice does not need to always be translated directly from research. Indeed, the results from the larger environmental scan suggest that some sustainable PA programs offered to children diagnosed with cancer were not translated from research [6]. It would be insightful to determine the way in which these programs were developed and if/how the coordinators ensure evidence-informed practice.

Taken together, findings confirm that only few research-based PA interventions are translated into practice underscoring that once research-based PA interventions end, children diagnosed with cancer are tasked with finding alternatives. Results underscore the barriers faced when engaging in knowledge translation of these and offer insights into strategies to overcome some barriers. As well, results raise important questions that need to be discussed about whose responsibility it is to translate evidence to practice. Moving forward, researchers are urged to consider translating their interventions to sustainable programs to enhance PA participation opportunities for this population. Collaborating and developing practical interventions are likely crucial steps needed in order to get more children diagnosed with cancer moving.

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Declaration of Interest Statement

The authors declare no conflict of interests.

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