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spm@insp.mx
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Temple, Viviene A; Frey, Georgia C; Stanish, Heidi I
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Interventions to promote physical activity for adults with intellectual disabilities

Viviene A Temple, PhD,[1] Georgia C Frey, PhD,[2] Heidi I Stanish, PhD.[3]

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Abstract

Objective. To describe interventions designed to promote physical activity for adults with intellectual disabilities and the effects on overall physical activity levels and on health outcomes. **Materials and methods.** A systematic review of eight databases until January 31, 2015 identified 383 citations. The inclusion criteria were: a) the study sample consisted of adults with intellectual disabilities, b) the study implemented an intervention to initiate, increase, or maintain physical activity, and c) quantitative or qualitative data were used to report the effectiveness of the intervention. Six articles from the 383 citations met this criterion. **Results.** Three studies resulted in significant increases in physical activity behaviour; however well-controlled trials designed to improve weight status by increasing physical activity did not produce significant effects. **Conclusion.** Overall, the results indicate that interventions to increase physical activity should simultaneously target the individual with intellectual disability as well as their proximal environment over a sustained period of time.

Keywords: physical activity; intellectual disability; review; preventive health program; health promotion

Temple VA, Frey GC, Stanish HI. Intervenciones para promover la actividad física para adultos con discapacidad intelectual Salud Publica Mex 2017;59:446-453.
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Resumen

Objetivo. Describir las intervenciones diseñadas para promover la actividad física para adultos con discapacidad intelectual y los efectos en los niveles de actividad física en general y en los resultados de salud. **Material y métodos.** Una revisión sistemática de ocho bases de datos hasta el 31 de enero de 2015 identificó 383 citas. Los criterios de inclusión fueron: a) los participantes del estudio fueron adultos con discapacidad intelectual; b) el estudio implementó una intervención para iniciar, aumentar o mantener la actividad física; c) se usaron datos cuantitativos o cualitativos para informar la efectividad de la intervención. Seis artículos de 383 cumplieron con los criterios. **Resultados.** Tres estudios resultaron en aumentos significativos en conductas de actividad física; sin embargo, los ensayos controlados diseñados para mejorar el peso corporal al aumentar la actividad física no produjeron efectos significativos. **Conclusión.** En general, los resultados indican que las intervenciones para aumentar la actividad física deben dirigirse simultáneamente al individuo con discapacidad intelectual, así como su entorno próximo durante un periodo de tiempo sostenido.

Palabras clave: actividad física; discapacidad intelectual; revisión; servicios preventivos de salud; promoción de la salud

(1) University of Victoria. British Columbia, Canada.
(2) Indiana University. Indiana, USA
(3) University of Massachusetts Boston. Massachusetts, USA

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Corresponding author: PhD. Viviene A. Temple. University of Victoria. PO Box 3015 STN CSC, Victoria, British Columbia. V8W 3P1, Canada.
E-mail: vtemple@uvic.ca

There is substantial evidence to support that regular participation in physical activity promotes health in adults. Specifically, physical activity reduces the risk for coronary heart disease, stroke, hypertension, diabetes, some cancers, and metabolic syndrome; improves bone mineral density; increases cardiorespiratory and muscular fitness; and is important for achieving a healthy weight.[1,2] The World Health Organization's (WHO) *Global Recommendations on Physical Activity for Health*[2] state that adults aged 18-64 years should engage in 150 minutes of moderate intensity aerobic physical activity or 75 minutes of vigorous intensity activity each week. Bone- and muscle-strengthening activities should also be done at least twice weekly. Despite the well-established association between physical activity and health, research consistently demonstrates that levels of inactivity are rising in many countries. Physical inactivity is the fourth leading risk factor for global mortality and is a significant public health concern worldwide.[3]

Adults with intellectual disabilities (ID) are no exception to the rising trends of physical inactivity. The activity habits of adults with intellectual disabilities have been reasonably well-studied and there is evidence to support that this group is insufficiently active to achieve health benefits and may be even less active than the general population. In 2006, we published a review paper[4] that aimed to characterize the physical activity levels of adults with intellectual disabilities in an effort to inform future research. At that time, the published findings supported that adults with intellectual disabilities were predominantly sedentary and less than one-third met the physical activity guidelines for health in the country where the study was conducted. Comparisons of activity levels to the general population were weak and we reported that measurement limitations, in particular lack of valid and reliable instruments to quantify physical activity, reduced the strength of the evidence. Temple followed up with a review of studies that used objective monitors, specifically pedometers and accelerometers, to measure physical activity of individuals with intellectual disabilities in 2010.[5] Once again, evidence supported that a small proportion of adults with intellectual disabilities met the guidelines for physical activity and health, but results were variable and how this group compares to the general population remained unclear. Temple reported that studies using objective monitors were small scale and included mostly individuals with intellectual disabilities who had more mild limitations. Additional research has been conducted using accelerometers to objectively measure physical activity in adults with intellectual disabilities since that review was published, and the strength of results have increased concomitantly.

These recent international studies suggest that the proportion of adults with intellectual disabilities meeting national guidelines for physical activity may be lower than suggested by Temple and colleagues in 2006. Researchers in Norway examined accelerometer-determined physical activity and sedentary behaviour in a large sample of adults with Down syndrome, Williams syndrome, and Prader-Willi syndrome; all genetic conditions associated with intellectual disabilities.[6] These authors found that individuals spent 63% of their day in sedentary activity and 3% in moderate to vigorous intensity physical activity. Although on average individuals accrued 27 minutes per day of moderate to vigorous physical activity, overall only 12% of the sample met the Nordic recommendations of physical activity. Similarly, Barnes, Howie, McDermott, and Mann[7] found that adults with intellectual disabilities accumulated an average of 108.6 minutes per week of moderate to vigorous intensity physical activity, but only 23.7% of their sample of 131 adults with intellectual disabilities met the United States national physical activity recommendations of 150 minutes of moderate-to-vigorous physical activity per week. In Scotland, Matthews and colleagues[8] found that adults with intellectual disabilities accumulated an average of 12.8 minutes per day of moderate intensity physical activity as measured by accelerometer which is well below the recommended amount of physical activity for health.[8] Further, adults with intellectual disabilities were engaged in sedentary behaviour for an average of 10.2 hours per day. A comparison of accelerometer-measured physical activity and sedentary behaviour of older adults with intellectual disabilities to two groups; younger adults with intellectual disabilities and older adults without intellectual disabilities was conducted by Dixon-Ibarra and associates.[9] All three groups spent 60 to 65% of their day (i.e., the time that they wore the accelerometer) in sedentary activity and about four hours per day engaged in light physical activity. Although there were no significant differences among groups, older adults with intellectual disabilities and younger adults with intellectual disabilities spent an average of 10.2 and 21.0 minutes per day in moderate-to-vigorous physical activity, respectively. In this study, only 6% of older adults with intellectual disabilities and 13% of younger adults with intellectual disabilities met the physical activity standards in the United States. These accelerometer studies provide evidence to support that adults with ID generally exhibit low levels of physical activity.

There have been efforts to understand the factors that influence physical activity among adults with intellectual disabilities in order to inform intervention

strategies. Given the intellectual, behavioural, social, and motor impairments that are often associated with an intellectual disability, the factors that influence physical activity participation for these adults may differ from the general population. A particular focus has been the examination of barriers to physical activity faced by adults with intellectual disabilities. For example, adults with Down syndrome reported that no transportation, high cost, and no one to participate with were the most prevalent access barriers to exercise.[10] Further, lack of energy, exercise being too difficult, and exercise being boring were reported as prevalent cognitive-emotional barriers. Weather, cost, health, and feeling lazy were the most commonly reported barriers to physical activity by adults with intellectual disabilities in a study by Temple.[11] A review paper of barriers to physical activity among adults with ID further supported that primary barriers were transportation, financial limitations, and lack of awareness of program options.[12] Interviews were conducted with a sample of adults with intellectual disabilities in an effort to determine the factors that predict low activity.[13] Older age, immobility, having epilepsy, having no daytime opportunities, and living in congregate care were examples of factors that contributed to the activity levels of this group. A second qualitative study examined the preferences, facilitators, and barriers to physical activity experienced by older adults with intellectual disabilities.[14] The most commonly reported facilitators of physical activity were enjoyment of the activity, support from staff/family to participate, and social contact/friendship with others. Commonly reported barriers included dislike of an activity, physical discomfort, lack of support, and activity being too difficult. From these examples of studies endeavouring to explain the low physical activity levels of adults with intellectual disabilities, it is evident that the process of planning and implementing physical activity interventions for adults with intellectual disabilities may be different than for the general adult population.

The low levels of physical activity reported among adults with intellectual disabilities coupled with their unique functional limitations and additional barriers they may face, have created a pressing need to develop and test interventions. An evaluation of the work is fundamental to identifying effective strategies for increasing physical activity and health outcomes among adults with intellectual disabilities. As such, the aim of this review is to describe what characterizes interventions designed to promote physical activity for adults with intellectual disabilities; and the effects of the interventions on overall physical activity levels and on health outcomes.

Materials and methods

Literature search strategy

A systematic search for interventions to promote participation in physical activity for adults with intellectual disabilities was performed using the following literature databases: Academic Search Complete, CINAHL, Cochrane Central Register of Controlled Trials, Health Source: Nursing/Academic Edition, MEDLINE, PsycARTICLES, PsycINFO, and SPORTDiscus until January 31, 2015. Terms for the outcome of interest (physical activity or pedometer or accelerometer or global positioning system) were combined with population search terms (intellectual disability or mental retardation or learning disability or developmental disability) and (adult) as well as with the study design characteristics (intervention or program). Reference lists of relevant publications were also scanned for eligible articles.

Study selection and data extraction

The following inclusion criteria were defined before the systematic search was performed: a) the study sample consisted of adults with intellectual disabilities, b) the study implemented an intervention to initiate, increase, or maintain physical activity, and c) quantitative or qualitative data were used to report the effectiveness of the intervention. We opted to include all study designs, not only randomized controlled trials, to provide a more comprehensive overview of the interventions being conducted in the field. Unpublished work, review papers, meta-analyses, study protocol articles, and studies that focused on care-providers' efficacy to implement interventions were excluded. When uncertainty about article inclusion occurred the authors came to agreement through discussion.

The systematic search identified 383 citations. Consistent with the Cochrane Handbook for Systematic Reviews of Interventions,[15] the identified citations were initially screened to remove obviously irrelevant reports. Eighty-three articles were retrieved following this initial screening. The abstracts were reviewed and 77 articles were excluded for the following reasons: 42 did not focus on adults with intellectual disabilities, physical activity was not a measured outcome for 19 articles, 10 studies did involve the collection of original data, three were duplicates within the databases searched, two studies did not have an experimental design, and one study focused on adolescents. Ultimately, six papers were reviewed. Characteristics of participants, study aim and design, intervention description, outcome measures, methods of analyses, and findings in terms of effect on physical activity and other health outcomes were extracted.

Results and discussion

Table I illustrates that interventions focusing on increasing physical activity and documenting these changes among adults with intellectual disability is a fairly recent phenomenon. To date, very few studies have been undertaken and these studies have generally been small in scale. Encouragingly, researchers have (on the whole) used validated approaches to document physical activity. Four studies used motion sensors (accelerometers and pedometers), which are the preferred approach to measuring physical activity among individuals with intellectual disability,[4] since there is only a modicum of evidence that conducting surveys with persons with intellectual disabilities supported by caregivers[16] or with proxy respondents[17] can provide accurate physical activity data. One of the studies included in this review used systematic observation of physical activity behaviours,[18] which is certainly an adequate approach in terms of validity and reliability,[19] however it is very labour intensive and less suitable for larger studies.

The targets of the interventions were generally adults with intellectual disabilities who were younger than 66 years of age. Only one intervention collectively targeted individuals with intellectual disabilities and their caregivers; and older adults (> 75 years of age) were the participants in one study (table I). The large age range within the other five studies was notable, and it was not evident from the intervention descriptions if activities were tailored to demographic sub-groups i.e. young adults versus those in middle or late adulthood (table II and the more expansive supplementary material online[20]). There has been concern expressed that the needs of young adults with intellectual disabilities are not adequately served by generic programming for individuals with intellectual disability.[21,22] For example, 11% of participants in the Bazzano and colleagues[23] study were 18–29 years and 25% were older than 50 years of age. However, it appeared that the same exercise videos were used by the peer mentors and it was unclear whether there was any individualization when participants used community facilities as part of the education sessions.

Table I illustrates that the settings for the interventions were largely service agencies. In the case of Bazzano and colleagues[23] the peer mentors (adults with developmental disabilities hired as peer mentors) advised that the program be delivered at the community organization serving the needs of individuals with developmental disabilities because the venue was familiar, accessible, and centrally located with a bus service nearby. Although delivered at service agencies, the general intention of the Bazzano and colleagues,[23] Bodde and colleagues,[24] and

Table I
SUMMARY OF STUDY CHARACTERISTICS

	No. of studies (%)	*No. of participants (%)*
Year of publication		
2000 - 2009	1 (16.7)	
≥ 2010	5 (83.3)	
Country of publication		
USA	5 (83.3)	
Sweden	1 (16.7)	
Number of participants at baseline		
Total number		752
Range		(range
0-49	2 (33.3)	17–443)
50-99	2 (33.3)	
100-149	1 (16.7)	
≥ 150	1 (16.7)	
Age (years)*		
Mean		
18 – 66	5 (83.3)	
≥ 67	1 (16.7)	
Gender‡		
Male		319 (44.0)
Female		362 (49.9)
Not specified		44 (6.1)
Physical activity measure		
Accelerometer	3 (50.0)	537 (71.4)
Pedometer	1 (16.7)	130 (17.3)
Observation (SOFIT)	1 (16.7)	17 (2.3)
Administered survey	1 (16.7)	68 (9.0)
Intervention target participants		
Adults with intellectual disabilities	5 (83.3)	622 (82.7)
Caregivers and adults with intellectual disabilities	1 (16.7)	130 (17.3)
Intervention setting		
Service agency	4 (66.7)	572 (76.1)
Supported and independent living	1 (16.7)	130 (17.3)
Clinical research training centre	1 (16.7)	50 (6.6)
Study design		
Randomized controlled trial	3 (50.0)	623 (82.8)
Quasi-experimental design	1 (16.7)	44 (5.9)
Pre-experimental design	1 (16.7)	68 (9.0)
B-A-B-A reversal	1 (16.7)	17 (2.3)

* None of the studies with participants in the age range 18–66 years, stratified their data by more specific age categories

‡ Denominator based on total n with results

SOFIT: System for Observing Fitness Instruction Time[19]

B-A-B-A: a reversal design where B = intervention and A = data collection

Table II
Description of the intervention studies included in this review

Authors, country, cim and design	*Setting and intervention name and target*	*Results*
Bazzano and colleagues,[23] USA Effect on: BMI, dietary habits, exercise, self-efficacy; access to health care, life-satisfaction, and community capacity. Design: pre-test post-test one group design	Setting: service agency Program name: the healthy lifestyle change program Intervention target: persons with ID Duration: PA and education, 2x 2hr/week for seven mon	Significant improvement in BMI (pre-test= 33.3, post-test= 32.8) and WC (pre-test= 41.3in, post-test= 40.4in), PA frequency (pre-test= 3.2x/wk, post-test= 3.9x/wk) and duration (pre-test= 133 min/wk, post-test= 206min/wk), most eating habits, self-efficacy toward exercise, and making doctor's appointment. Mixed findings for healthy eating self-efficacy and knowledge.
Bergström and colleagues,[26] Sweden Impact of a novel three-component programme on physical activity and dietary habits Design: cluster RCT	Setting: home Program name: Hälsokörkortet (driver's licence for health) Intervention target: persons with ID and caregivers Duration: 12–16 mon	Controlling for baseline values, clustering, and type of residence, regression analysis revealed a significant increase in PA (b=1 608 steps/day, p= .045). A significant effect for total work routines (p= .016), domains of general health promotion work (p= .010), and PA (p= .043). No significant effect on BMI, WC, dietary quality, or satisfaction with life.
Bodde and colleagues,[27] USA Effectiveness of health education curriculum on PA knowledge, skills, and participation. Design: pre-post delayed treatment design Quasi-experimental	Setting: service agency Program name: promoting health through physical activity knowledge and skills Intervention target: persons with ID Duration: 8 x 30 min	Significant pre-test to post-test increases in knowledge (both NAKS and PARA); but only knowledge of PA recommendations significantly improved in relation to the control condition. Minutes of MVPA did not change from pre-test (M= 7.0 min, SD= 21.6) to post-test (M= 7.7 min, SD= 31.5), p= .41.
McDermott and colleagues,[25] USA Efficacy of a health promotion intervention to prevent increase in BMI and to increase physical activity Design: RCT	Setting: service agency Program name: steps to your health Intervention target: persons with ID Duration: 1x 90 min/wk for eight wks	At baseline 20% of sample overweight and 59% obese, no difference between groups. No significant change in BMI at 12m and no between group differences. At baseline 16.9% of entire sample accumulated 150 minutes MVPA/week. No significant change in MVPA at 12m or group differences.
Stanish and colleagues,[18] USA To facilitate MVPA in the workplace Design: B-A-B-A reversal design	Setting: service agency (sheltered workshop) Program name: none Intervention target: persons with ID Duration: 3 x 15-17 min/wk for 10 wks	82% of employees engaged in in the program up to 3d/wk. The removal of the exercise leader only reduced the level of group engagement in MVPA by 7%. Verbal praise and encouragement seemed to be adequate to maintain the interest of most participants.
VanSwearingen and colleagues,[29] USA Compare: the task-oriented, motor sequence learning exercise (TO) to the impairment oriented, multi-component exercise (IO) on activity and participation Design: single-blind RCT	Setting: clinical research training centre Program name: task-oriented, motor sequence learning exercise (TO) Intervention target: persons with ID Duration: 2 x 20-30 min/wk for 12 wks	Physical activity did not change for either group from pre-test to post-test. Gait speed improved for both groups. In addition the TO group improved the energy cost of walking, gait efficacy, and lower extremity functioning. However, change in gait efficiency did not mediate change in activity or participation outcomes.

MVPA: Moderate-Vigorous Physical Activity, NR: Not Reported, PA: Physical Activity, BMI: body mass index; WC: weist circumference, A more detailed table and description of intervention in these articles is available at reference 20

RCT: randomized controlled trial
B-A-B-A: a reversal design where B = intervention and A = data collection
PARA: Physical Activity Recommendations Assessment
NAKS: adapted Nutrition Activity Knowledge Scale

McDermott and colleagues[25] studies was to enhance general participation in physical activity. Contrastingly, the worksite intervention by Stanish and colleagues[18] was designed to increase physical activity while at work. The only study delivered in people's homes was the Swedish study by Bergström and others.[26]

Effects on physical activity

Table II (and the supplementary table online[20]) illustrates that three of the six studies reported significant improvement in physical activity post-intervention.[18,23,26] Stanish and colleagues found that participants were able to

engage in moderate-vigorous physical activity at work when a video aerobic dance program was available (with or without a leader). The B-A-B-A design of that study lends some confidence to the findings, and the study demonstrated that there is the potential to have a positive impact on opportunities for, and participation in, physical activity in a discrete environment. Results from the Healthy Lifestyle Change Program[23] also suggested increases in both the duration and frequency of physical activity. However the lack of a control group and the lack of detail about how physical activity was assessed limit our understanding of the meaningfulness and generalizability of these findings. However, Bazzano and colleagues' study[23] was a pilot project, and as such, their findings are encouraging and it would be useful for this study to be replicated using a more robust research design and an objective measure of physical activity. The third study demonstrating a significant effect on physical activity participation was conducted by Bergström and others.[26] This cluster randomized control design study sought to influence the personal behaviours of individuals with intellectual disabilities as well as influence their social and physical environments by impacting the caregivers' knowledge, skills, and work routines. In terms of physical activity, this intervention had a significant effect at two levels. Firstly, there was a significant improvement in s caregivers' work routines in relation to the promotion of physical activity for residents, and secondly the residents (individuals with intellectual disability) significantly increased their steps per day by 1 203 steps compared to the control group.

Two of the health promotion programs that did not have a significant effect on participation in physical activity were directly targeted to individuals with intellectual disability and involved one session per week for eight weeks.[25,27] It is possible that each of these interventions involved an insufficient 'dose' to have a significant effect, but it is also likely that an intervention that targets only individuals with intellectual disability is insufficient to sustain change. Change for an individual does not occur in isolation, it also involves interactions with the immediate or closest aspects of the environment such as with caregivers, family, and community organizations.[28] The evidence from Bergström and colleagues[26] suggests that to be effective in producing change in physical activity, both individual and environmental constraints need to be addressed concurrently.

The third study that did not lead to a significant increase in physical activity was a comparison of an innovative mobility intervention to the usual practice mobility intervention for older adults with intellectual disabilities.[29] Although there was not a significant effect (p = .09) on physical activity at the end of 12 weeks, there was a significant effect on the energy cost of walking, gait efficacy, and lower extremity functioning. Again, the duration and/or frequency of the intervention may have been insufficient for the effects on gains in functioning to translate into significant improvements in physical activity.

Effects on other health outcomes

Except for the Stanish and colleagues[18] study, which solely focused on physical activity outcomes, each of the interventions was designed to positively impact other aspects of health in addition to physical activity, specifically: BMI and waist circumference, healthy eating, self-efficacy toward making doctor's appointment, life satisfaction, and knowledge about physical activity. While the Bazzano and colleagues[23] pilot study indicated there was a significant effect on BMI and waist circumference, neither of the randomized controlled trials[25,26] significantly impacted BMI. Nor did Bergström and colleagues[26] find a significant effect for waist circumference, dietary quality, or satisfaction with life. Clearly there is not a sufficient weight of evidence to be definitive about any of these interventions and outcomes so far. However, the studies in this review with the strongest research designs (i.e. RCTs) did not show significant effects for weight status measures or dietary quality.

It is clear from this review that experimental research focused on increasing participation in physical activity and promoting physical activity to improve the health of adults with intellectual disabilities is in its infancy. What is very encouraging is that well-controlled trials are now being implemented, plus researchers are publishing study protocols and formative evaluations[14,24,30,31] (that are yet to be published as randomized controlled trials) which will help with broader program implementation and hopefully the state of the intervention and implementation literature in the near future.

Conclusions

Despite evidence that regular participation in physical activity promotes physical and psychosocial health in adults, the available evidence suggests that among adults with intellectual disabilities, physical activity levels are low, levels of sedentary behaviour are high, and less than one-quarter meet national guidelines for physical activity. Despite the potential benefits of physical activity and low levels among adults with intellectual disabilities, this review demonstrates that research to document the process and outcomes of physical ac-

tivity interventions is sadly lacking. The modicum of evidence that does exist demonstrates that short- and medium-term improvements in physical activity levels are possible. The evidence to date demonstrates that a targeted intervention in the workplace can improve physical activity levels in that discrete context,[18] but to achieve a more pervasive increase in physical activity among adults with intellectual disabilities a 'multi-pronged' and sustained approach is needed.[23,26] It seems clear that programs of a relatively short duration (i.e. 8-12 sessions) targeting a single context are insufficient to produce substantive changes in physical activity behaviour among adults with intellectual disabilities. However, Bergström and colleagues[26] did demonstrate that by working with both caregivers and individuals with intellectual disabilities for more than a year, significant and meaningful changes in physical activity could be achieved. Although some improvements in other outcome variables were noted among the studies in this review, the most common outcome of interest in these physical activity studies i.e. weight status, showed little change. What is necessary to increase physical activity and subsequently improve weight status remains unclear. Thus, from this review, we recommend that programs designed to increase physical activity among adults with intellectual disabilities simultaneously target the individual with intellectual disabilities as well as their proximal environment (e.g. caregivers) over a sustained period of time.

Declaration of conflict of interests. The authors declare that they have no conflict of interests.

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