

Interventions to improve physical activity in daily life of people with intellectual disabilities. Detailed results presentation of a scoping review.

Bruland D. ¹, Schulenkorf T. ¹, Nutsch N. ¹, Nadolny S. ¹, Latteck Ä.-D. ¹

¹ University of Applied Sciences Bielefeld, Germany



Pictures from Stefan Albers, Atelier Fleetinsel, 2013

Author correspondence:

Dirk Bruland, University of Applied Sciences Bielefeld, Interaktion 1, 33619 Bielefeld, Germany.

E-mail address: dirk.bruland@fh-bielefeld.de

Proposal for citation:

Bruland D., Schulenkorf T., Nutsch N., Nadolny S., & Latteck Ä.-D. *Interventions to improve physical activity in daily life of people with intellectual disabilities. Detailed results presentation of a scoping review.* Bielefeld: Universität Bielefeld; 2019.

DOI: 10.4119/unibi/2939511



This license lets others remix, adapt, and build upon the original work non-commercially, and although new works must also acknowledge the original work and be non-commercial, new works don't have to license their derivative works on the same terms.

förges-**Network**

The scoping review was carried out by the research project 'förges 3' It belongs to the consortium „User-oriented care: Promotion of health in the context of chronic diseases and care dependency”, called förges network.

The research network is based on the collaboration of five non-profit welfare organizations in the federal state of North Rhine-Westphalia, the School of Public Health (Bielefeld University), and the Faculty of Business and Health, University of Applied Sciences Bielefeld (FH Bielefeld). The network runs from April 2018 to March 2021 and is funded by the Stiftung Wohlfahrtspflege (<http://www.sw-nrw.de/home/>). The network is coordinated by the Bielefeld University.

In five projects scientific based strategies for the promotion of health and self-management support are developed, pilot tested and validated. The projects are framed by cross-sectional analyses (förges Q). The major research objectives are:

- Enabling user-orientated care, i.e. a needs-based care that allows maximum quality of life.
- Maintaining autonomy despite chronic conditions by strengthening health literacy, self-management, and user participation – here regarded as nursing task.

[https://www.uni-bielefeld.de/\(en\)/gesundhw/ag6/projekte/foerges.html](https://www.uni-bielefeld.de/(en)/gesundhw/ag6/projekte/foerges.html)



Gefördert durch:



Abstract

Today, low levels of physical activity are a major health problem for society and are associated with an increased risk for chronic diseases especially by people with intellectual disability. To our knowledge, target group concepts to promote physical activity addressing daily life are rarely. For this, the aim of our research project is to develop, test and validate a multi-modal target-group-oriented intervention. This intervention will promote a physically active lifestyle by promoting health-related literacy, Physical activity-related health competence and self-efficacy. The first step of the project is to review the current state of interventions promoting physical activity in people with intellectual disability with a focus on daily life activities. This article describes the approach and the findings of the conducted scoping review.

In general, 33 articles could be included. They were sorted by overviews, systematic reviews, studies, and curriculum. For a good overlook and comparison data were mapped for each category, except the single curriculum. Likewise, for all categories the results were summarized via a qualitative thematic analysis in a narrative format. For this, we identify relevant statements in the articles according to our research questions: a) How is motivation of the participants discussed? b) How are the needs of participants integrated in the intervention? c) Are competencies/physical requirements for physical activity of users analyzed and if so, how? d) How are the interventions evaluated? We added categories if we think that they are important for our own intervention development.

This report has three goals:

- a) It is a tool-box (pool of ideas) mainly with basic concepts and tested strategies for our own development but also with other information about e.g. barriers and facilitator.
- b) Above that, with the detailed results presentation, we would like to achieve good transparency on which data basis our intervention will be developed.
- c) We like to share our results with interested.

Content

- 1) Introduction..... 1
 - 1.1 Background 1
 - 1.2 Research project förges 3 2
 - 1.3 Aim of the scoping review 2
 - 1.4 Presenting structure 3
- 2) Identify the research question 3
- 3) Identify relevant studies 4
- 4) Study selection and data screening 5
 - 4.1 Study selection 5
 - 4.2 Data screening 7
- 5 Charting the data 9
- 6 Collating, summarizing, and reporting results 10
 - 6.1 Structure 10
 - 6.2 Overviews..... 11
 - 6.3 Systematic reviews 17
 - 6.4 Studies 27
 - 6.5 Curriculum 44
- 7) Limitations and strength of this review 46
- 8) Implication for our research project..... 47
- 9) References of included articles 49
- 10) References of text sources 52

1) Introduction

1.1 Background

Today, low levels of physical activity are a major health problem for society and are associated with an increased risk for chronic diseases (Guthold et al. 2018). Physical inactivity (lack of physical activity) has been identified as the fourth leading risk factor for global mortality (6% of deaths globally) (WHO 2009). Moreover, the WHO estimate that physical inactivity is a main cause for e.g. approximately up to 25% of breast and colon cancers, 27% of diabetes and approximately 30% of ischaemic heart disease burden” (WHO a).

The World Health Organization (WHO a) defined physical activity

“as any bodily movement produced by skeletal muscles that requires energy expenditure. ... The term “physical activity” should not be mistaken with “exercise”. Exercise, is a subcategory of physical activity that is planned, structured, repetitive, and purposeful in the sense that the improvement or maintenance of one or more components of physical fitness is the objective. Physical activity includes exercise as well as other activities which involve bodily movement and are done as part of playing, working, active transportation, house chores and recreational activities.”

Recommendations from the WHO (no year mentioned, b) for physical activity are as follows:

“Adults aged 18–64 should do at least 150 minutes of moderate-intensity aerobic physical activity¹ throughout the week or do at least 75 minutes of vigorous-intensity aerobic physical activity throughout the week or an equivalent combination of moderate- and vigorous-intensity activity”.

Compared to the general population diseases occur more frequently and often earlier in lifetime in people with intellectual difficulties (PWID) (e.g. Mair & Offergeld 2014, Patja et al. 2008, MacRae et al. 2015, O’leary et al. 2018). A positive effect of physical activity on prevention and health preservation has been proven (Bergström et al. 2013, van Schijndel-Speet et al. 2017). By promoting physical activity, health literacy and physical activity-related health competence (e.g. Sudeck & Pfeifer 2016) the risk of diseases can be minimized, existing diseases can be managed better and the course of a disease can be positively influenced (Bruland et al. 2019). However, due to reduced cognitive ability, communicative and reading-writing skills, people with intellectual disability are mostly unconsidered in concepts and have less

¹ Aerobic physical activity is done for longer periods of time – mostly defined as longer than two minutes as the body adjusts to the activity and begins to supply sufficient oxygen to the muscles.

access to programs promoting physical activity (Emerson et al. 2014, Hasseler, 2014). In addition, there are many challenges in social activities and they have a different access to health-related resources than the general population (Hasseler, 2014). To our knowledge, target group concepts addressing daily life are rarely and above that, in Germany there is no intervention integrating the perspective of participants in the development process (Bruland et al. 2019).

1.2 Research project förges 3

The project förges 3 tries to close this (research) gap. For this, the aim is to develop, test and validate a multi-modal intervention with the participation of future users in a demand-oriented and target-group-oriented manner. The intervention will promote a physically active lifestyle by promoting health-related literacy, Physical activity-related health competence and self-efficacy. It is carried out in cooperation with the 'Lebenshilfe Brakel Wohnen Bildung Freizeit gGmbH', which is an integration assistance service with several residents and ambulatory offers for people with intellectual disability. The project will be performed in three steps:

1. A scoping review about interventions to promote physical activity in people with intellectual disability,
2. Analyzing individual movement experiences as well as desires and needs of future intervention users (people with intellectual disabilities) regarding the promotion of their own physical activity via methodological triangulation (target group adapted interviews, participatory observation, explorative online survey for staff and document analysis – conducted in 2019),
3. Developing, testing and validating of an intervention in cooperation with the future users.

An article about the project, which also describes the idea of the planned intervention is published (Bruland et al. 2019).

1.3 Aim of the scoping review

This scoping review is a basis for our intervention development. In general, a scoping review is well suited where the purpose of the review is to scope a body of literature, clarify concepts or to investigate research conduct (Munn et al. 2018). The aim of this scoping review is to map the state of research and prepare the results in a structured way. It serves for the identification and clarification of important concepts, processes and modes of action. Consequently, the results will inform the conceptualization and development of the own intervention.

2) Identify the research question

The report has three goals:

- a) It is a tool-box (pool of ideas) mainly with basic concepts and tested strategies for our own development but also with other information about e.g. barriers and facilitator.
- b) Above that, with the detailed results presentation, we would like to achieve good transparency on which data basis our intervention will be developed.
- c) We like to share our results with interested.

1.4 Presenting structure

The scoping review was conducted using methodological guidelines from Arksey and O'Malley (2005) and Levac et al. (2010). The present scoping review consists of five steps (Arksey and O'Malley 2005):

- Identify the research question;
- Identify relevant studies;
- Study selection;
- Charting data; and
- Collating, summarizing, and reporting results.

We add the chapter 'Identifying the implications of the study findings for our research' (concerning to Levac et al. 2010) to present, how the results will be used for our research project.

2) Identify the research question

Our focus is on physical activity according to the WHO-definition described above in people with intellectual disabilities. A special view is on physical activity, that could be implemented in daily life (routines) like using stairs instead of taking an elevator, decide to walk (a few stations) instead of using a bus and everything that can be installed in daily life (see inclusion/exclusion criteria below). According to this, the primary research question is:

„What is the state of the art in interventions to promote physical activities addressing daily life situations for people with intellectual disabilities?“

This question should lead to an overview of fitting interventions with regard to our research interest. Secondary research questions focus on:

- How is motivation of the participants discussed?
(In general but with a main focus on how the participants are motivated to stay physical active during the intervention)

3) Identify relevant studies

- How are the needs of participants integrated in the intervention?
(Main focus on participatory approaches or how participants can share their experience/needs to the intervention and its modification)
- Are competencies/physical requirements for physical activity of users analyzed and if so, how?
(Are restrictions of the participants recorded and how are they taken into account)
- How are the interventions evaluated?

3) Identify relevant studies

A systematic approach was employed to identify articles to review. To identify relevant studies, six databases were searched by using English search terms from publication dates 01/01/1998 up to the 11th October 2018. We have decided to consider articles ten years before the UN Convention on the Rights of Persons with Disabilities come into force. We assume that attitudes towards people with intellectual disabilities have changed years before and after the Convention came into force and there are more projects, that are in line with our participatory research strategy. Following databases were searched:

- Medline via PubMed
- CINAHL via EBSCOHost
- PsycInfo via EBSCOHost
- Eric via EBSCOHost
- Web of Science

Additionally, one database was searched using German search terms (PSYNDEX via EBSCOHost). Furthermore, reference lists of included review articles were searched manually (DB) for potentially relevant publications. The search terms were generated by examining terminology used in current literature about people with intellectual disability and physical activities (see table 1 for English and table 2 for German).

Table 1: English search terms

Target group	Activity and health related behavior	Mobility	Antonym
intellectual* disab* or learning disab* or mental* deficien* or mental* disab* or mental* handicap* or developmental disab* or intellectual	physical activit* or physical action* or (habitual/physical) exercis* or exertion or "Physical fitness" evtl. Health* behav* or behav* change*	Move*or mobil*or agilit*or flexibil*	physical inactivity or immov* or immob*

4) Study selection and data screening

handicap* or mental* retard* or mental* subnormal* or down syndrome			
--	--	--	--

Table 2: German search terms

Target group	Activity and health related behavior	Mobility	Antonym
Geistig* Behinderung or intellektuell* Behinderung	Bewegung OR körperl* Aktivität	No search terms	No search terms

We combined search terms using Boolean operators and used wildcard characters in order to cover all spelling variations of the search terms. As an example, the following algorithm has been used in PubMed:

((intellectual* disab*[Title/Abstract]) OR (developmental disab*[Title/Abstract]) OR (learning disab* [Title/Abstract]) OR (mental* deficien*[Title/Abstract]) OR (mental* disab*[Title/Abstract]) OR (mental* handicap* [Title/Abstract]) OR (intellectual handicap*[Title/Abstract]) OR (mental* retard* [Title/Abstract]) OR (mental* subnormal* [Title/Abstract]) OR (down syndrome[Title/Abstract]) ((AND (physical activit*[Title/Abstract]) OR (physical action*[Title/Abstract]) OR ((habitual OR physical) exercis*[Title/Abstract]) OR (exertion[Title/Abstract]) OR ("physical fitness"[Title/Abstract]) OR (health* behav*[Title/Abstract]) OR (behav* change*[Title/Abstract]) OR (physical inactivity[Title/Abstract]) OR (immov*[Title/Abstract]) OR (immob*[Title/Abstract]))))

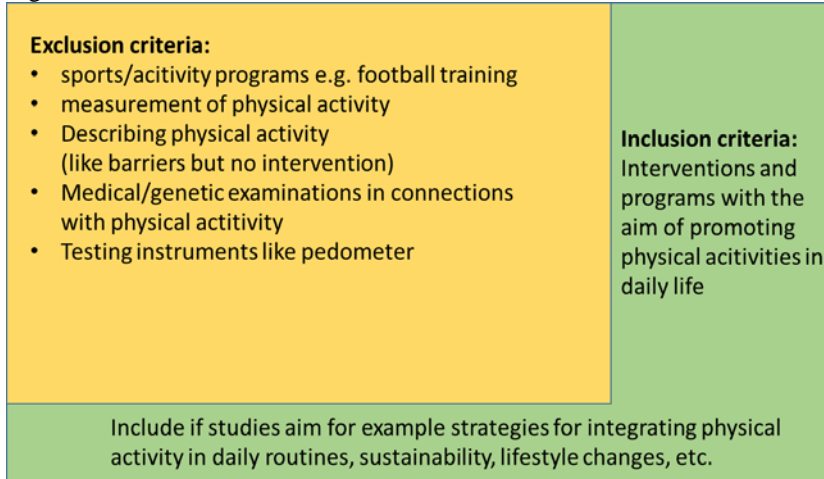
We identified 3,190 articles through database searches. Subsequently, we discussed the balance of feasibility with breadth and comprehensiveness of the founded articles (following Levac et al. 2010). We (DB, TS and ÄDL) decided that the identified numbers of articles were sufficient balancing comprehensiveness of the review and resources including timeline of the project.

4) Study selection and data screening

4.1 Study selection

For the purpose of this search, the following criteria were used (see also figure 1):

Figure 1: Inclusion and Exclusion criteria.



In detail, these are following inclusion criteria:

- People with intellectual disability
- Concepts and intervention programs to promote physical activity (related to daily life / routines)
- Adults (\geq over 18 years),
- English and German language
- Published from 01/01/1998 up to search date
- All relevant studies regardless of their design and quality, including overviews and systematic reviews.

Exclusion criteria were:

- Article without involving people with intellectual disability
- Main focus on other diseases e.g. epilepsy in people with intellectual disabilities (too specific)
- Focus on children and adolescents under 18 years
- Sports/exercises/fitness programs, which did not focus activities for daily life or without any lifestyle changes, e.g. football training, fixed exercise programs as training units
- Main focus on medical examinations in connection with physical activity (e.g. cardiovascular exercises) or validation studies of assessments/outcome measures
- Epidemiologic studies describing physical activity levels
- Not describing promoting physical activity or any intervention
- Studies published before 1998
- Any other language than English or German

- Conference abstracts
- Study Protocols of now published studies (see e.g. Pérez-Cruzado & Cuesta-Vargas 2013 & 2016).

4.2 Data screening²

Data screening was as follows (see also figure 2 next side):

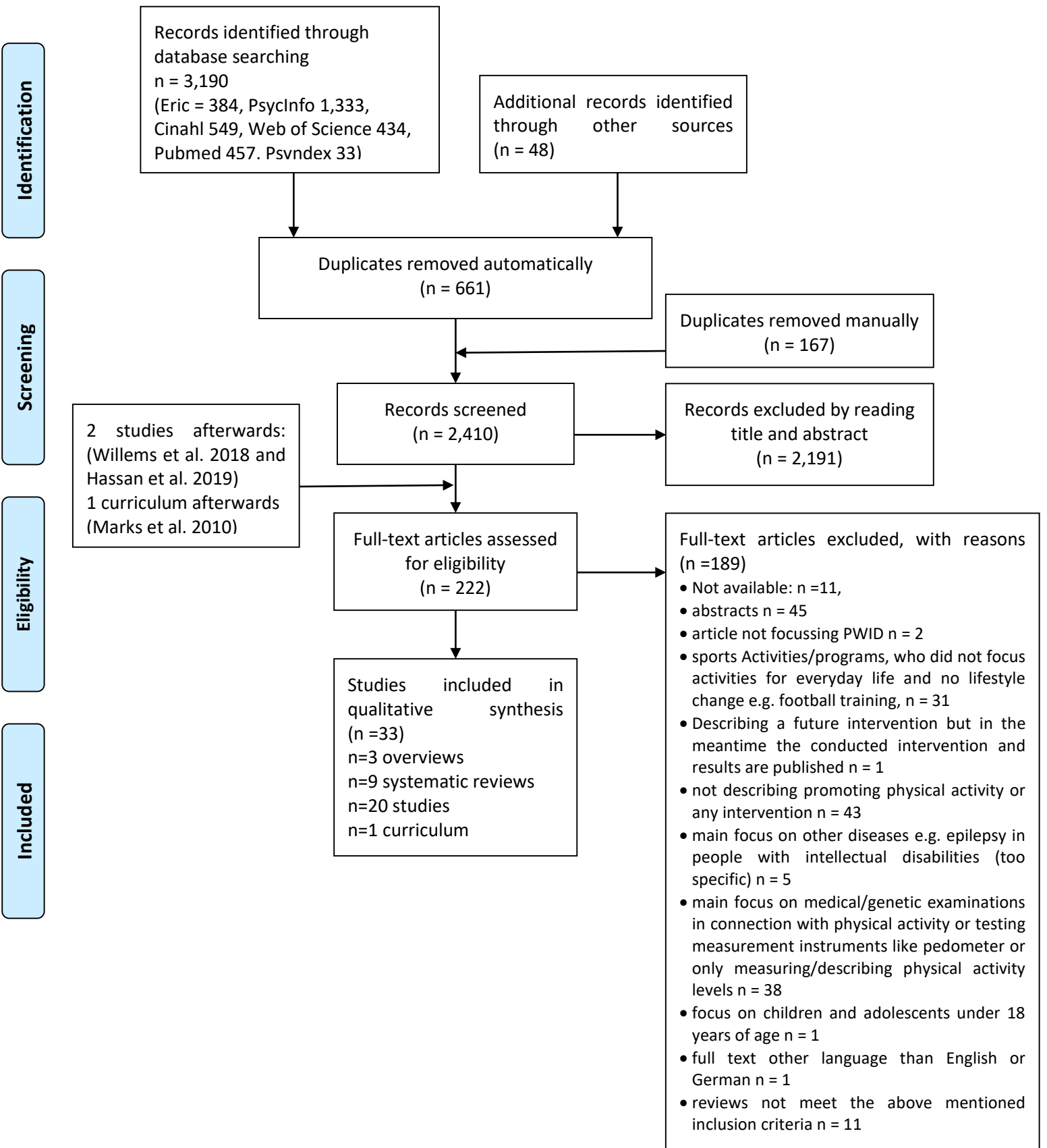
Founded literature from the databases was imported to the reference management software CITAVI 6 (n=3,190) and complemented manually by the additional records identified through other sources (n=48). Those are mainly from literature reviews from our institute with a different attention focus / research questions. Others were found randomly by searching for articles e.g. similar articles have been proposed. Duplicates were removed automatically and manual which resulted in a total of 2410 articles. Two researchers (DB, TS) independently screened titles and abstracts of the retrieved records for inclusion. After title and abstract screening 222 articles remained. Whenever it was unclear from the title and abstract if an article should be included, the fulltext was retrieved and the eligibility criteria reapplied. We retrieved the full-text articles and same researchers independently rated each as relevant or irrelevant. Disagreements were solved by a third researcher (ÄDL). By agreement among all researchers three studies which meet the inclusion criteria were included afterwards, for reason that information from them could be very relevant: Two reviews were published afterwards our search date (Hassan et al. in 2019 and Willems et al. in November 2018), the third one is a curriculum and were not included in the data base assessment. Finally, full Text screening resulted in a total of 33 included articles for analysis.

One researcher (DB) search in the literature list of systematic reviews and overviews to find articles about interventions not found until this step and check them for inclusion criteria. No more article had to be added. The identified articles were already included or did not meet the inclusion criteria. The article of Willems (2017) don't have a literature list of the included studies, thus, the studies could not be checked.

² Following lists are attached: Attachement No. 1: all studies after removing duplicates; Attachement No. 2 excluded titles with reasons.

4) Study selection and data screening

Figure 2: Prima Flow Chart



5 Charting the data

Data analysis were conducted by three researchers (DB, NN, ÄDL). First, the included studies were categorized as follows:

a) Overviews

- which present an overview of literature, search process to identify relevant literature is not documented

b) Systematic reviews

- which identify literature in a systematic way and use explicit methods to select, extract and analyze

c) Studies

- which present an intervention, its background, development, implementation and/or evaluation.

d) Curriculum

- which include planned sequence of instruction

The data were mapped for each category, except the curriculum. First, to get a good overlook and comparison of the overviews and reviews, they were coded.

Overviews were coded to:

- author,
- publishing year,
- country,
- research questions / aim of the overview,
- inclusion and exclusion criteria,
- No. of included studies,
- main content,
- results, and
- limitation.

In the same way reviews were coded and following codes were added:

- databases,
- search terms as well as
- study/intervention characteristics of included studies.

For coding the studies, we orientated to the coding in included reviews and take over following categories:

- Author
- Year
- Country
- Sample (inclusion criteria)
- Setting
- Type of physical activity
- Type of intervention
- Intervention description
- Length of programme / frequency / duration
- Theoretical basement
- Provider
- Physical activity outcome measure
- Results
- Discussion
- Limitations

We added for our interest, motivation (how motivation was maintained?), needs of participants (how needs of participants are regarded?) and assessment of competencies/physical requirements (how are competencies and physical requirement of the participant are taken into account?), PA outcome measure, as well as limitations of the study. In our analyzing process we found out, that most articles refer to same interventions and we combine same interventions for reasons like it is sufficient to describe an intervention information (e.g. aim, duration, setting, description of intervention elements) once.

All tables are in attachment 3.

6 Collating, summarizing, and reporting results

6.1 Structure

For all categories the results were summarized via a qualitative thematic analysis in a narrative format. For this, we identify relevant statements in the articles according to our secondary research questions:

- How is motivation of the participants discussed?
(In general but with a main focus on how the participants are motivated to stay physical active during the intervention)

- How are the needs of participants integrated in the intervention?
(Main focus on participatory approaches or how participants can share their experience/needs to the intervention and its modification)
- Are competencies/physical requirements for physical activity of users analyzed and if so, how?
(Are restrictions of the participants recorded and how are they taken into account)
- How are the interventions evaluated?

Results in line to the research questions as well as relevant results for our research project are presented for each category. This means that we added categories to if we think that they are important for our own intervention development. First, we summarize the main results of overviews and systematic reviews. The next analysis step in line with the research question is the summarizing of the included studies. Finally, the included curriculum is described. We like to remind that this report is a tool-box (pool of ideas) with basic concepts and strategies for our own development. Therefore, we did a detailed results presentation. According to this, for example, we try to avoid data loss and in parts where it made sense, direct quotations from the articles were used. A quality assessment of included studies was not conducted. The reason is that the included reviews describe challenges for quality assessment in research with people with intellectual disabilities adequately (see 6.3 chapter Results of reviews and quality of studies). Due to the heterogeneity of included studies in terms of interventions and outcomes, statistical analysis or meta-analysis were also not conducted.

6.2 Overviews

Article overview

There are three overviews, all conducted in Western Countries (USA/Canada (2), Israel (1)). All of them are published in the same period (from 2006 – 2008). Two of them are from the same author, but with a different research question (see attachment No. 3). Stanish et al. (2008) states that people with intellectual disabilities (PWID) were normally not included in large-scale population studies and received relatively less attention in health promotion efforts or physical activity campaigns (but she does also argue that in 2001, the U.S. Surgeon General held a conference to address health disparities in PWID and set an agenda to reduce these disparities). For this reason, there is a lack of information about health indicator segments for PWID.

Nevertheless, Stanish et al. (2006) and Lotan (2007) present important physical activities for PWID:

Stanish et al. (2006): „Major sources of physical activity for adults with ID ³ “:	Lotan (2007) „The positive contributions that exercise programs entail have led to the implementation of various intervention programs for individuals with ID. These programs included:“
Walking* and cycling for transport	Stair climbing
Chores and work	Walking, running, stretching, and aerobic exercises
Dancing	Floor and flexibility exercises
Special Olympics	A mile run, use of a rowing machine, weight lifting, bicycle training
	Treadmill training
	Walking

*„Walking for transport was by far the most prevalent form of physical activity, but studies suggest the intensity may not be sufficient to meet the minimum recommendations to achieve health benefits“ (Stanish et al. 2006).

How is motivation of the participants discussed?

Stanish et al. (2006) discuss that PWID „are highly motivated to engage in activity as a social outlet, similar to the nondisabled.“ However, the barriers for PWID are higher than in the general population (see below).

Motivation during the intervention was kept by ribbons and medals received through Special Olympics (Stanish et al. 2006), token systems and verbal encouragement (Stanish et al. 2008). One of the mentioned intervention shows, that some programs are not performed in the long run by the participants: „A core group of individuals continued to do aerobics with the videos for a month but the level of active engagement was slightly reduced. Both articles supported that adults with ID will be active if provided enjoyable opportunities like aerobics, but the direct involvement of others (i.e. staff, families) is needed to facilitate participation and promote adherence“ (Stanish et al. 2008). Stanish et al. (2006) describes „This is a concern because reliance on this type of external reinforcement may not be conducive to activity maintenance.“

The staff plays a very important role for motivation: „Lack of staff motivation to promote physical activity, a lack of physical activity counseling, and high client-to-staff ratios have all been reported as constraints to participation. Individuals with MR⁴ articulated that caregivers, teachers, coaches, and medical personnel rationalized, enabled, and oftentimes encouraged

³ ID = Intellectual disabilities

⁴ MR = mental retardation a synonymous word for intellectual disability, but it is offensive, therefore it is only used in direct quotations

sedentary behaviors. Independent participation in activity was largely discouraged by reinforcing fears and the need for constant supervision. Persistent messages were that participants should not over exert themselves or “overdo it.” These negative messages were well-intentioned efforts to protect seemingly vulnerable individuals but the outcome was that participants with MR developed perceptions of disempowerment, physical fragility, overreliance on supports, and incompetence with regard to being physically active“ (Stanish et al. 2006).

The question arises for our intervention (which cannot be answered here), how much support is necessary and how much self-determination is possible in an intervention to promote PA?

In which way the needs of participants are integrated in the intervention?

Only Stanish et al. (2006) mention negatively that due “to the general description of environmental determinants there have been few attempts to study social and environmental factors that influence physical activity from the perspective of the individual with MR.”

Are competencies for physical activity of users analyzed and if so, how?

Lotan (2007) gives information focussing on physical requirements. Its about precautions before physical activity (PA) mainly medical tests to detect diseases, which are important for the level of PA, like heart defects. It is also mentioned by the author to have a look at diet:

„Abnormal energy expenditure and substrate utilization can also be present in individuals with DS. Therefore, in order to avoid lowering already inadequate intakes of several vitamins and minerals, physical exercise programs for individuals with DS⁵ should combine a balanced diet with vitamin and mineral supplementation“ (Lotan 2007).

How the interventions are evaluated?

Stanish et al. (2006) describes that there is no „gold standard“, and gives assesments for physical activity, demonstrate acceptable validity and reliability:

- Doubly labeled water (calculates the energy consumption via the carbon dioxide tax)
- Self reports (diary/log, recall questionnaire, quantitative history, and global self-report)
- Motion Sensors / accelerometers (sensors measure limb or segment acceleration as an index of human movement and provide a direct, objective measure of physical activity in field-based settings)
- Pedometers (measure steps and distance in response to vertical acceleration, but it is important to note that the devices are not as sophisticated as accelerometers)
- Heart rate monitors
- Direct observation.

⁵ Lotan focus on people with Down Syndrom (DS), which belongs to intellectual disabilities.

„There are advantages and disadvantages associated with each method and those most commonly used to examine naturally occurring physical activity behavior are self-reports, activity monitors, and pedometers“ (Stanish et al. 2006). Stanish et al. (2006) noted further that only pedometers have been examined for validity for people with ID, the use of multiple methods enhance accuracy and multiple measures allow „a more comprehensive understanding of physical activity behavior since single methods are limited in scope. Combined use of objective (motion sensors or pedometry) and subjective (self-reports) instruments will likely provide the best assessment of both the quantity and quality of movement in people with MR“ (Stanish et al. 2006).

Stanish et al. (2006, 2008) also point out concerning evaluation that:

- “There has been only one study that actually used a comparison group to assess the magnitude of difference in physical activity between those with and without MR” (2006).
- “The use of proxy respondents as data sources and a 4-week activity recall also calls into question the validity of these findings for reasons previously discussed” (2006).
- “While many interventions have been short-term and some have methodological shortcomings (e.g. small sample size), it is beneficial to review the findings of previous work to guide future research and practice” (2008).

Barriers and facilitators

In addition, the overviews describe barriers and facilitating factors for physical activity. Lotan (2007) mentioned limitations set by the physical environment (residence type), by personal characteristics on participation in exercise programs (physical requirements), and by close human environment (family/caregivers). Stanish et al. (2006) describe five categories of potential barriers and facilitating factors of physical activity: Demographic and biological factors, Psychological/cognitive/emotional factors, Behavioral attributes and skills, Social and cultural factors and Physical environment factors.

Stanish et al. (2008) pointed out barriers for physical activities in PWID:

„Lack of energy, too difficult, and boring were the most commonly reported cognitive-emotional barriers by people with Down syndrome while caregivers perceived that lack of interest, lack of energy, and too lazy to be the most dominant barriers. In regards to access, the main barriers reported by individuals with Down syndrome were no transportation, costs too much, and no

one to show how to exercise. Caregivers agreed that transportation and cost were the significant barriers to access.“

„The staff groups reported that their ability to provide physical activity opportunities to the individuals with ID that they serve was limited by many variables. The barriers noted were 1) limited options and choices for leisure in the community for people with ID, 2) limited financial resources required for services like transportation and staff, 3) staffing ratios that precluded the adults with ID from having the support that they required to engage in an activity, 4) limited financial resources of people with ID required for program/facility fees and transportation, and 5) unclear policy guidelines for residential and day program service provision.“

Reccomondations to promote physical activitiy

The authors' recommendations are quoted verbatim:

Stanish et al. (2006): „Including physical activity into the daily routines of people with ID can also promote health. For example, increasing walking intensity (i.e. speed) to and from work was proposed as a strategy to increase appropriate physical activity. Reducing sedentary time, like television watching, is also essential to health promoting physical activity. Staff and family members can facilitate activity opportunities to reduce the need for paid instructors and high levels of supervision in the community.“

Lotan (2007): „To prescribe a beneficial exercise program properly, one must have a basic understanding of the elements of exercise physiology and energy metabolism, as well as of the cardiovascular, respiratory, and musculoskeletal responses to exercise and training. Such specific knowledge is mandatory when constructing an appropriate activity program for any population. The basic elements all sport activities should entail are cardiovascular exercise, strength training, balance, and flexibility. ... [But not] Flexibility because of the hypermobility and joint laxity that is common in DS, it is not a recommended activity for this population. ... A broad habilitational concept should take into account for the physical development of the individual with DS, but also the person's social, emotional, and cognitive growth.“

Stanish et al. (2008) stated evidence, that physical acitvity has a positive influence on flexiblity, but also argued, that people with Down Syndrom may respond differently to exercise trainings.

Stanish et al. (2008): “Educational plans should accompany direct activity programs so that people have both the knowledge and the skills to pursue active lifestyles. Even more importantly, physical activity promotion must involve care providers. If care providers are not aware of the benefits of physical activity and do not have the skills to assist people with ID then

it is unlikely that efforts will be sustainable. ... It is thought that individuals with ID are not motivated to seek out opportunities to be physically active, therefore, reinforcement strategies and high supervision have typically been used in efforts to promote activity. It is true that family members, residential care providers, employers, and/or other individuals that support people with ID will play a role in identifying opportunities to engage in activity and assist with participation. Therefore, an important step toward improving health behaviors is ensuring that care providers have the knowledge, skills, and resources to facilitate healthy living.”

Guidelines are also presented as a check list, see table 3.

Table 3: Guidelines for physical activities programmes in people with intellectual disabilities.

„Guidelines for exercise programs for individuals with DS should be“ (Lotan 2007):	„The following strategies are examples that could be considered when implementing programs for people with ID“ (Stanish et al 2008):
Collect pre-exercise medical data on each participant in order to evaluate contraindications and precautions when initiating the program.	Include motivational strategies and positive reinforcement.
Obtain physician consent.	Include low to moderate intensity activities such as walking.
Take into consideration the effects of medications on the body in relation to exercise.	Ensure that the activity is fun and involves social interaction.
Create a multidimensional activity program that entails endurance, strength, and balance optimal for health and functional benefits.	Involve participants in activity selection and decision making.
Make the program fun to participate in.	Select activities that are age-appropriate.
If exercise machines are involved, label them with pictures and provide verbal encouragement.	Conduct programs in community-based environments where there is opportunity for inclusion (but consider participant preferences).
Provide augmented constant supervision.	Be prepared to modify activities to accommodate all abilities.
Ensure constant monitoring of heart rate through exercise duration.	Monitor progress and set activity goals. and acting as role models; considering
Start the program with light activity that is enjoyable and pain free.	
Provide more visual guidance than verbal instruction.	
Incorporate motivational techniques (i.e., token reward system) to improve adherence.	
Gradually elevate the program's level of intensity.	
Construct a follow-up program, teaching the clients themselves to record their own information to improve long-term adherence and empowerment.	

Ensure an emergency procedure plan for all programs, especially community-based programs. Make socially acceptable elements in the program.	

6.3 Systematic reviews

Article overview

There are nine article sorted to the category systematic reviews, all conducted in Western Countries (USA (3), USA/Canada (1), Australia (2), Netherlands (2), Scotland (1)). Six of them are published after 2017, and three from 2011 up to 2014.

The most far-reaching search was the scoping review from Pitchford, Dixon-Ibarra and Hauck (2018), with the aim to body the current state of physical activity research in people with intellectual disability (included articles from 2000 to 2014). Overall, they found 362 studies related to physical activites for people with intellectual disabilities (PWID). Pitchford et al. (2018) used the five phases of the “Behavioral Epidemiological Framework” to characterize and analyze the identified articles. For our interest, only phase 4 and 5 are taken into account (“studies directly intervening to change physical activity behavior or translating intervention into community-based programming“). Only 34 articles were coded in these two phases, thereof more than a quarter of them are not for adults (people under 18 years old). Pitchford et al. (2018) discuss that interventional and translational research were limited in their search, but also indicate a progress within the field health promotion for people with intellectual disability. Temple et al. stated in 2017 that interventions focusing on increasing physical activity and documenting these changes among adults with ID⁶ are a fairly recent phenomenon. This could be the reason why systematic reviews are mainly published in the last years.

Included reviews focus on following topic:

- a) A scoping review from Pitchford et al. mentioned above.
- b) Four reviews analyzing the strength of evidence on the effectiveness and feasibility of programs, strengths and weaknesses of interventions as well as characteristics of interventions (Bartlo & Klein 2011, Brooker 2014, Temple et al. 2017, Hassan 2019).
- c) Heller & Sorensen (2013) focus on health promotion for a special age group: adults with a main view on aging with ID⁷. The article reviews the research on health promotion

⁶ ID = Intellectual disabilities.

⁷ Heller & Sorensen use the term developmental disabilities as a synonym for intellectual disabilities in their review.

interventions, including physical activity interventions, health education and mixed approaches and screening services.

- d) Harris et al. (2018) analyze multi-component weight management interventions for adults with ID and overweight/obesity and include programs to promote physical activity.
- e) Willems et al. (2017 and 2018) focus on Behaviour Change Techniques (BCTs) and the International Classification of Functioning, Disability and Health (ICF-model) in lifestyle change interventions for PWID.

Notes on the categories:

b) The inclusion criteria and the orientation of the questions vary between the systematic reviews e.g. while Hassan et al. (2019) considers only RCTs, Brooker et al. (2014) considers all peer reviewed articles regardless of research design. The results also differ between the included reviews. Our main interest is not a comparison of the studies, but to find points of reference for our research questions. Therefore, we focus on hints and recommendation for our intervention development.

c) Heller & Sorensen (2013) indicate that “although this review aims to explore health promotion in the context of aging, none of the included studies were limited to older adults, though a few focused exclusively on adults in middle age and older.” The systematic review found positive effects of physical activity interventions, mixed approaches (e.g., inclusion of health education) and screening services on health outcomes of people with intellectual disabilities (for more details see attachment 3).

d) Harris et al. (2018) gives good hints to physical activity, but is limited in the discussion and conclusion to the focus on weight management, in the small number of identified studies and in the restricted generalizability to all adults with intellectual disabilities. Only one integrated study in this review achieved physical activity recommendations for PWID (for more details see attachment 3).

The following interventions were indicated in the reviews, which are listed here by way of example:

Walking, bicycling, ergometry, resistance training of upper body and/or lower body, stepping activities, balance activities, dancing, plyometric activities, weight bearing

games, stretching, recumbent stepper, elliptical trainer rowing and health education classes, video aerobic dance program, healthy lifestyle change program, progressive resistance training, cycling and treadmill training.

Harris et al. (2018) distinguishes three types of interventions: 1) A structured format of physical activity incorporated as part of an intervention (e.g. once per week, aerobic based activities, strength/muscular endurance activities and stretches to increase flexibility), 2) lifestyle physical activity (walking and activities that can be done at home such as calisthenics e.g. Jumping Jacks), and 3) health education approaches.

How is motivation of the participants discussed?

Bartlo & Klein (2011) “found that the biggest impact of self-directed approach was that people not initially involved in the activity program wanted to join after observing those in the program.” Other statements could not be found.

In which way the needs of participants are integrated in the intervention?

Willems et al. (2018) mentioned that “the current lifestyle change interventions are not optimally adapted for people with intellectual disability. This is in line with a previous review which found that carer led health promotion interventions for people with intellectual disabilities were either ineffective or insufficiently tailored to the needs of people with intellectual disabilities”.

Are competencies for physical activity of users* analyzed and if so, how?

It is not mentioned in the reviews. However e.g. Bartlo and Klein (2011) refer to fitness tests to have data for comparison.

How the interventions are evaluated?

(Only hints that seemed relevant to our research aim, are listed here).

Bartlo & Klein (2011) reported usement of the Quality of Life questionnaires in several studies (but with different measures in the studies). Booker et al. (2014) mentioned the use of the International Physical Activity Questionnaire Short Form (IPAQ-S). It is argued that “subjective measures that were used (for example, the IPAQ-S) were ... problematic; the IPAQ-S has been found to be valid and reliable in numerous populations but has only been found to have limited agreement between objective measures of PA.”

Temple et al. (2017) preferred approach motion sensors (accelerometers and pedometers), because of the valid data. Accelerometer were also mentioned and Booker et al. (2014) discuss

the low compliance rate in this regard. For example, they draw attention that “difficulties that arose participants were using accelerometers were not discussed.”

Other reported evaluation instruments are interviews and self-reported physical activity. However, it is also discussed by Booker et al. (2014) that “difficulties arise with recall, abstract concepts of intensity and duration of PA, and if completed by proxies, the ability of carers to accurately complete the survey. Relying on proxy respondents is not ideal as it may not be a true representation of the participant’s views. Alternative methods to surveys to measure PA may be using qualitative methods (i.e. in-depth interviewing or participant observation) or alternative data collection tools (i.e. picture surveys).”

While Temple et al. (2017) named systematic observation (with the references to very labour intensive and less suitable for larger studies), Willems et al. (2017) named case series: “A case series is a study that collects observations on a series of individuals, receiving the same intervention. These observations are made before and after an intervention, with no control group”. This seems to be very labour intensive and less suitable for larger studies, as well.

Results of reviews and quality of studies

The results in the included reviews are very heterogeneous, show different effects and vary in success. For example, Hassan et al. (2019) concluded aptly: „Our study showed that the body of evidence was small, with only nine randomised controlled trials having investigated the effectiveness of interventions to increase physical activity for individuals with ID. The majority of the trials (six trials) found no differences between groups that suggests the experimental interventions that have been evaluated are no more effective than the control interventions. Only three trials found positive effects on physical activity.“

However, in general, the quality of studies is rated and methodological problems are reported. We quoted the statements from the different reviews below:

Heller & Sorensen (2013): „Although as a whole the studies reviewed here show positive results of health promotion interventions, the research has many limitations. Few of the studies targeting physical activity and nutrition health education and activities included strong research designs, sufficient sample sizes, and long-term follow-up. Across the three types of studies, there is little research on the long-term impacts of the interventions or on short or long-term changes in health status.“

Brooker et al. (2014): “However, these results are based upon a small number of studies mostly of a pre-post-design with small sample sizes. None of the measures used in the studies reviewed have been demonstrated to be valid or reliable in people with intellectual disability and, importantly, findings lacked follow-up data to determine the impact of interventions in the long term”.

Willems et al. (2017): „Heterogeneity is also found for multiple study characteristics, like levels of disability, setting of the interventions, the targeted populations and the aimed lifestyle change (nutrition or PA, or both PA and nutrition).“

Williams et al. (2018): „Several methodological problems, such as small sample size, short intervention duration, lack of follow-up and loss of participants during the intervention resulting in incomplete outcome data.“

Hassan et al. (2019): “None of the included trials were assessed to be at low risk of bias – all of the trials were rated as high risk of bias in at least one, and usually across multiple, domains of the Cochrane Risk of Bias Tool. Specifically, trials were often at risk of selection bias (from lack of allocation concealment), detection bias (from lack of assessor blinding) and attrition bias (from incomplete outcome data).“

Willems et al. (2017) discuss the reasons for not using RCTs: „Furthermore, the RCT is the gold standard to evaluate lifestyle change interventions, but an RCT design was not often used in the included interventions. This could partly be explained by perceptions about the ethical issues surrounding the inclusion of people with ID in lifestyle change research. For example, the conflict between one’s own autonomy to participate and the dependence on family and staff for participation. Also, previous research shows high drop-out rates and large amount of incomplete data in lifestyle change RCTs for people with ID, which may limit the generalizability of the results. ... for greater use of other design studies, that can be implemented more easily, are less expensive and fit the ethical issues experienced in research for people with ID. However, people with ID are entitled to the same level of evidence-based healthcare as all citizens and the RCTs included in this review suggest that it is feasible to use this design to test the effectiveness of interventions, considering the mentioned difficulties.“

Overview of Behaviour Change Techniques (BCTs) and theoretical frameworks

Harris et al. (2018) named following Behaviour Change Techniques (BCTs):

Prompt practises, provide instruction on how to perform the behaviour, barrier identification/problem solving, action planning, prompt self-monitoring of behaviour, model / demonstrate the behaviour, plan social support / social change, and stress management / emotional control training.

Willems et al. (2017) count the frequency of used BCTs in their included studies (see figure 3 & 4).

Figures 3 & 4: Frequency of used BCTs (Willems et al. (2017))

<i>BCT</i>	<i>Frequency</i>	<i>BCT</i>	<i>Frequency</i>
Provide information on consequences of behaviour in general	27	General communication skills training	5
Plan social support/social change	26	Prompt review of outcome goals	4
Provide instruction on how to perform the behaviour	23	Teach to use prompts/cues	4
Goal setting (behaviour)	19	Facilitate social comparison	4
Prompt practice	17	Stress management/emotional control training	4
Barrier identification/problem solving	15	Use of follow-up prompts	3
Prompt self-monitoring of behaviour	14	Prompt identification as role model/position advocate	3
Action planning	13	Prompting generalisation of a target behaviour	2
Model/demonstrate the behaviour	13	Provide information about others' approval	1
Provide feedback on performance	11	Shaping	1
Provide information on where and when to perform behaviour	10	Stimulate anticipation of future rewards	1
Provide rewards contingent on successful behaviour	9	Provide information on consequences of behaviour to the individual	0
Set graded tasks	9	Provide normative information about others' behaviour	0
Environmental restructuring	8	Agree behavioural contract	0
Prompt rewards contingent on effort or progress towards behaviour	7	Prompt anticipated regret	0
Prompt self-monitoring of behavioural outcome	7	Fear arousal	0
Relapse prevention/coping planning	8	Prompt self-talk	0
Prompt review of behavioural goals	6	Prompt use of imagery	0
Goal setting (outcome)	5	Motivational interviewing	0
Prompting focus on past success	5	Time management	0

Following theoretical frameworks were mentioned as basis for the intervention:

- Social cognitive theory,
- Transtheoretical model,
- Theory of planned behaviour,
- Behaviour change techniques,

- Dynamic systems theory,
- Bronfenbrenner ecological theory of human development.

However, in general there is a lack of theoretical frameworks stated:

Hassan et al. (2019): „An additional limitation is that not all included trials were based on a theoretical framework, which is considered an important prerequisite for designing an effective physical activity intervention”.

Williams et al. (2017): „Another similarity in the three study categories was the lack of a theoretical framework to inform the design of the intervention (n=31). ... Although a theoretical base is important for interventions in order to be effective and for understanding of the results, a majority of the included studies did not use any kind of theoretical framework. In addition, the BCTs were mostly used in an implicit way, not referring to any theoretical base nor describing the BCT explicitly.“

Aspects to pay attention to:

- Differences between people with intellectual disability in general and people with Down Syndrom (Barto & Klein 2011): “We believed this because of the greater quantity of research being published with adults with DS⁸ compared with adults with intellectual disability not related to down syndrome. Generalizability of the following results to all individuals with intellectual disability should be done with some caution as the majority of participants had Down Syndrom as their origin of intellectual disability”. Furthermore Hassan et al. (2019) stated: “However, while the intervention has shown to be beneficial for young adults with Down syndrome, additional evaluation is required to confirm if this intervention is effective in different populations with ID.“
- Looking at the target group, it becomes obvious that a lot of studies include people with mild and moderate intellectual disabilities and only a few studies examine individuals with severe disabilities. If people with Down syndrom are included is not mentioned in all studies.
- Age group: “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“ (Temple et al.

⁸ DS = Down Syndrom

2017). For example, in the review of Hassan et al. (2019) age of participants varied from 9 months to 83 years.

- Setting: A lot of studies enhance general participation in physical activity on work, but only a few at home.
- Comply with the recommendations of the American College of Sports medicine (similar to the recommendation of the WHO): “Only one study in this review achieved the current physical recommendations (150 min of moderate intensity physical activity per week” (Harris et al. 2018).
- Way, how physical activity is promoted: “All studies used face-to-face delivery, except the physical activity intervention of Thomas & Kerr (2011), which was delivered by log-books. These log-books contained information about exercise and helped clients to set personal goals.” (Willems et al. 2017) (log-book is requested unsuccessful by NHS Wales via Email in 2019)

Recommendations / aspects to promote physical activity

Booker et al. (2014) describes in common: „Our findings suggest that interventions have had some success in using goal setting strategies, health education focusing on the benefits of PA⁹ in a group and individualised format, incorporating PA into the intervention and using group and individual delivery modalities.“ More specific recommendations from the reviews are listed below:

- Individuality and target needs of users: „When selecting the type of physical activity, thought should be given to the benefit and feasibility of each type of activity it is important to adapt any intervention to fit the unique physical or cognitive challenges that an individual with intellectual disability presents has.“ (Bartlo & Klein 2011) „lifestyle change interventions adapted to people with ID to avoid dropout and further improve effectiveness“ (Williams et al. 2018).
- Setting and locations: The location is important due to transportation limitations (Bartlo & Klein 2011). „The evidence to date demonstrates that a targeted intervention in the workplace can improve physical activity levels in that discrete context, but to achieve a more pervasive increase in physical activity among adults with intellectual disabilities a ‘multipronged’ and sustained approach is needed“ (Temple et al. 2017).

⁹ PA = physical activity

- Cost of equipment and training of personell: Low cost will be easier to maintain for the long term (Bartlo & Klein 2011). „Other benefits to a progressive resistance training programme include being simple to perform and relatively simple to resource (improving applicability to the intended population). However, while the intervention has shown to be beneficial for young adults with Down syndrome, additional evaluation is required to confirm if this intervention is effective in different populations with ID.“ (Hassan et al. 2019).
- Theory framework: „Our findings suggest that the field of lifestyle change for people with ID lacks theory-driven interventions. Although the inclusion of BCTs can contribute to the quality and effectiveness of lifestyle change interventions, researchers should strive to include a detailed intervention description and use rigorous research methodologies.“ (Willems et al. 2017)

Regarding the theoretical framework two authors mentioned the International Classification of Functioning, Disability and Health (ICF-model):

- Williams et al. (2018): “However, outcome measures from the ICF categories „environmental factors“ and „participation“ were often neglected and personal outcome measures were mostly used by a single study. This is surprising, because previous research found that environmental barriers, support from others and personal motivation are relevant to healthy lifestyles for people with intellectual disabilities.”
- (Booker et al. 2014): „Interventions should be guided by the theoretical principles asserted by the ICF and should clearly articulate assumptions about where and how interventions are directed. For example, the ICF requires statements about whether interventions are targeted to individual behaviours (e.g., reducing the amount of time spent sitting) or structural factors (e.g., safer environments in which to exercise). Importantly, the ICF requires separation of impairment from disability, in recognition that structural barriers may disable those with cognitive or physical impairments. This is an empowering approach that places onus of responsibility on researchers and other health professionals to amend and adjust physical activity interventions to suit the lives of those with intellectual disability, rather than requiring individuals to fit into programs that might not be tailored to them.“

There are hints to the importance of caregivers, daily routine and sustainability:

- „Activity programs by health care professionals and an activity program that can be run by day habilitation staff is more likely to be sustainable“ (Bartlo & Klein 2011).
- Hassan et al. (2019): „The involvement of a caregiver as part of the intervention is likely to have been an important contribution to its effectiveness, as caregivers play a key role in encouraging physical activity and can assist in reducing the complexity of a multicomponent intervention. Further, adaptability of a programme to the routines of carers and residents was also favourable as it made the programme easier to implement and supported changes to physical activity. The features of this intervention were advantageous, as, first, the programme used staff members from the day activity centres to conduct the programme at the same facility, so the participants were familiar with the setting and the individuals implementing the intervention. Second, the programme was adapted to the needs of the participants, which helped to incorporate physical activity into their daily routine. This programme highlights the importance of designing interventions that use established facilitators to physical activity; these include support from others, familiarity and routine. It is possible that a lack of motivation (either intrinsic or extrinsic) may have influenced the outcomes of the intervention and participants’ intentions to continue performing physical activity in the long term. The use of a mentor, however, has the ability to overcome these barriers and improve physical activity by supporting the individual.“
- Hassan et al. (2019): „These findings suggest that a key benefit of the training programme is that it assists people in establishing a routine that involves daily physical activity while also preventing overall physical activity levels from declining over time. ... However, while the intervention has shown to be beneficial for young adults with Down syndrome, additional evaluation is required to confirm if this intervention is effective in different populations with ID.“

There are also hints of Long-term courses and organizational change:

- „Furthermore, a need exists for studies that examine not only the impact of short term health promotion interventions, but also examine the environmental supports and organizational changes that can help sustain these interventions. These approaches could include training of health professionals, administrators, and direct support professionals in community based programs with the aim of changing the culture of agencies serving adults with developmental disabilities.“ (Heller & Sorensen 2013).

- „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. 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.“ (Temple et al. 2017).

At last, the specific social and cultural context were named as an important but overlooked factor:

- „This might indicate that lifestyle change is dependent on the specific social and cultural context, and therefore research in this field might need to be tailored to the specific situation and context of the people with ID. However, the majority of included studies do not properly describe context related characteristics “ (Willems et al. 2017)

6.4 Studies

Article overview

In general, 20 studies including 12 interventions plus 1 intervention that has been enhanced from the original. The interventions are very different (see for a short overview table 4, for a more detailed overview see attachment 3). Therefore, the components of the interventions are categorized and described / compared below.

Table 4: Overview of interventions

Name of intervention	Aim	Authors
Step to your health	The program was planned to emphasize the benefits of weight loss, exercise, nutritional choices (avoiding fatty foods and simple carbohydrates), and stress reduction.	Ewing et al. 2004, Mann et al. 2006 & McDermott et al. 2012
No name	Promote physical activity in older people with intellectual disabilities	Podgorski et al. 2004
Healthy Lifestyle Chance Program (HLCP)	The HLCP intervention was designed and conducted with a participatory approach to promote physical activity.	Bazzano et al. 2009
Stockholm intervention	This complex health promotion intervention aimed at strengthening knowledge and skills among participants and staff, as well as building a supportive environment	Elinder et al. 2010, Sundblom et al. 2014, Bergström et al. 2013 & Bergström et al. 2014
Take 5	Take5 is an individual intervention involving family or paid carers to support participants, where appropriate. It took place in each individual's home environment.	Melville et al. 2011 & Harris et al. 2017
Physical Activity Knowledge and Skills (PHPAKS) curriculum	Goals of this curriculum are to increase the PA knowledge and skills of adults with ID by using multimedia educational methods within a theory- and literature-based design.	Bodde et al. 2012

6 Collating, summarizing, and reporting results

	With <i>enhancement</i> of exercise program and staff training	Chow et al. 2016
No name	weekly physical activity will be supervised by disability staff, who will be encouraged to follow an activity program set out by the university exercise specialist compared to an exercis program	Lante et al. 2014
Exercise and Nutrition Health Education Curriculum for Adults with Developmental Disabilities	two education program (1 for family / care givers and 1 for people with intellectual disability) regarding the curriculum named on the left side (the current curriculum is described below in chapter d) curriculum)	Yilmaz et al. 2014
Walk Well	Walk Well is an individual behaviour change intervention designed to support participants to make sustained changes in walking, increase overall physical activity levels and reduce sedentary behaviours.	Melville et al. 2015 & Matthews et al. 2016
Technology physical activity	physically active sessions that incorporated two technology enhanced modalities -- Sony Play Stations's DDR[R] (dance pad) and Nintendo's Wii[TM] Sports (bowling, tennis, and boxing).	Coyle et al. 2016
No name	multimodal intervention consisted a one hour session of physical activity where the therapist provided educational advice to people with an intellectual disabilityto carry out more physical activity and activity sessions to improve physical activity	Pérez-Cruzado and Cuesta Vargas 2016
menu-choice	it assists staff in including physical activity goals within the group home schedule. The staff and residents work together to develop weekly goals for residents activity.	Dixon-Ibarra et al. 2017

Setting and Country

Included studies are mainly from Western Countries:

- USA (8 studies with following intervention - Steps to Your Health curriculum, Podgorski et al. 2004, Physical Activity Knowledge and Skills (PHPAKS) curriculum, Technology physical activity, menu-choice),
- Sweden (4 studies from the Stockholm intervention),
- Scotland (4 studies two each for Take 5 and Walk Well programme),
- Hong Kong (1 – enhancement of Physical Activity Knowledge and Skills (PHPAKS) curriculum),
- Australia (Lante et al. 2014),
- Turkey (1 - Nutritional and Activity Education for people with intellectual disability, Spain (1 - Pérez-Cruzado and Cuesta Vargas 2016).

Most studies (5 are conducted in group homes) and one for each of the other named facilities:

Table 5: Overview of settings

Setting (as mentioned from author)	Name of intervention
Group home (5 studies)	menu-choice, Technology physical activity, enhancement of Physical Activity Knowledge and Skills (PHPAKS) curriculum, Stockholm intervention, HLCP intervention
occupational centre	Pérez-Cruzado and Cuesta Vargas (2016)
day centres for adults with intellectual disabilities	Walk Well
training centres for people with intellectual disabilities	Exercise and Nutrition Health Education Curriculum for Adults with Developmental Disabilities
Partner organization	Lante et al. (2014)

6 Collating, summarizing, and reporting results

Disability Service agencies	Physical Activity Knowledge and Skills (PHPAKS) curriculum
home environment or convenient location	Take 5
day habilitation center serving older adults with ID	Podgorski et al. (2004)
adults who were receiving some service (residential, employment, service coordination) through a network of local disability providers	Steps to Your Health curriculum

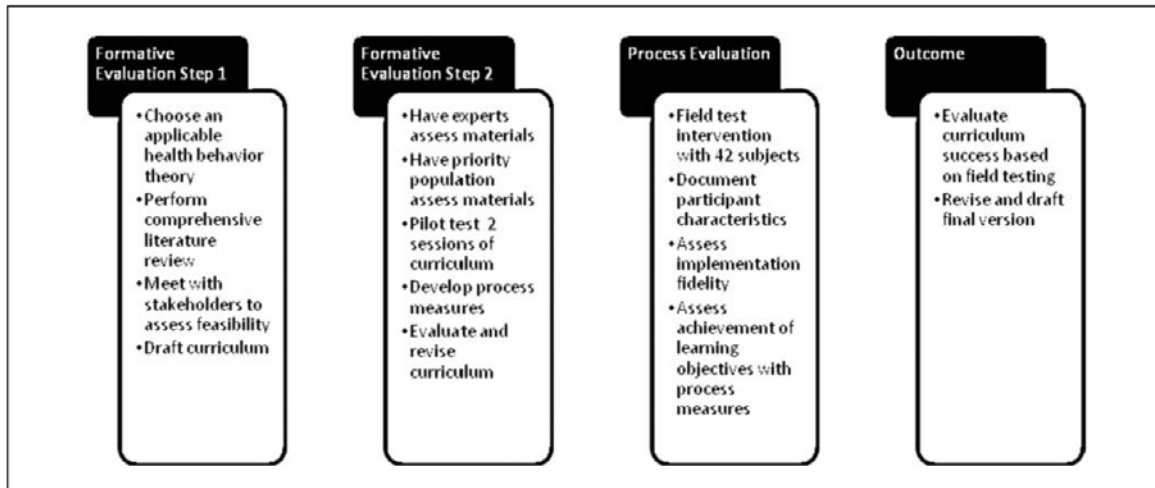
Development (basis) and theoretical framework

Table 6: Overview of Developmental basis of the interventions

Name of intervention	Development (basis)
Step to your health	Because there was no available curriculum that covered the desired breadth of topics, the preventive medicine physician wrote the Health Education Learning Program (HELP) manual (Ewing et al. 2004). After the completion of the HELP study the principal investigator collaborated with the author of HELP to develop the STYH curriculum, which is a modification of HELP that incorporates the concrete kinesthetic learning style of adults with ID.
Podgorski et al. 2004	developing on basis on American College of Sports Medicine's (1995) standards for group exercise classes .
Healthy Lifestyle Chance Program (HLCP)	The HLCP intervention was designed by „the team“ (participatory approach). A project oversight team composed of individuals with developmental disabilities, parents of individuals with developmental disabilities, staff, academic researchers, and community-based professionals with extensive experience working with developmental disabilities, including a behavioral psychologist, a dietician, Fitness instructors, nurses, physicians, a physical therapist, an occupational therapist, a pharmacist, and public health professionals. This team met weekly to decide on all aspects of the program, including planning, curriculum development, implementation, evaluation,
Stockholm intervention	new developed material with ten themes for use by staff:
Take 5	Take 5 is based on a weight-loss intervention programme used in Scotland of NHS. It was adapted for people with intellectual disabilities by a multidisciplinary group of clinical academics and health professionals.
Physical Activity Knowledge and Skills (PHPAKS) curriculum	this curriculum was developed using a multistep process of formative implementation and process evaluation (in 4 steps – see below).
Lante et al. 2014	Not mentioned
Exercise and Nutrition Health Education Curriculum for Adults with Developmental Disabilities	A developed curriculum was used
Walk Well	Adapting of Walk Well was a parent walking programme shown to be effective in studies involving adults, adults older than 65 years and as part of a multi-component weight loss programme for men at high risk of cardiovascular disease
Technology physical activity	The effective of technology is compared and evaluated.
Pérez-Cruzado and Cuesta Vargas 2016	Not mentioned
menu-choice	program development was derived from an evidence-based nutrition health promotion program for the group home setting

Bodde et al. (2012) describe the development of an intervention in four steps (see figure 5):

Figure 5: Developmental process of a health education program for PWID (Bodde et al. 2012)



Menu Choice (Dixon et al. 2017) describes performance of process evaluation:

“Operational guidelines were incorporated by applying theory in the design and implementation phases of the program, by conducting a process evaluation, and by selecting appropriate outcome measures for people with ID¹⁰. Participation guidelines included stakeholder involvement in development and implementation of the program, considering the values of targeted group by developing the program based on feedback from community stakeholders and providing ample opportunities for personal choice within program materials.”

Melville et al. 2015 (Walk Well programme) stated: “Therefore, it could be that the behaviour change techniques that contributed to the effectiveness of the parent walking programme are too complex and abstract for most adults with intellectual disabilities. So, those techniques and theoretical foundation must be tailored to the target group. The most mentioned theory for interventions is the social cognitive theory (4 times). But there are other theories for interventions and some named more than one foundation (like Take 5):

Table 7: Overview of theoretical frameworks

Theoretical framework	Name of intervention
Social cognitive theory	Step to your health, Stockholm intervention, Enhancement of Physical Activity Knowledge and Skills (PHPAKS) curriculum, Walk Well,
Social Learning Theory	Nutritional and Activity Education for people with intellectual disability
sessions were developed based on American College of Sports Medicine	Podgorski et al. 2004
Conceptual model of the Healthy Lifestyle Chance Program (HLCP)	Healthy Lifestyle Chance Program (HLCP) – see figure 6 below
goal setting,	Take 5, menu-choice
self-monitoring, review of goals and feedback were used in every session Specific, Measurable, Relevant, and Time-specific (SMART) goals were set relevant to individual dietary habits and physical activity levels.	Take 5

¹⁰ ID = Intellectual disability

6 Collating, summarizing, and reporting results

Ajzen's theory of planned behavior	Physical Activity Knowledge and Skills (PHPAKS) curriculum
goal setting theory & diffusion theory	menu-choice (goal setting theory (achievable goals with small manageable increases, inclusion of residents in the goal setting process, staff involvement), diffusion theory (different phases in which the adoption of an innovation occurs starting from group home agency managers and program coordinators to staff and residents to change the social system to acceptance of the innovation))
Transtheoretical model of behaviour change	Walk Well
Not mentioned	Lante et al. 2014, Technology physical activity, Pérez-Cruzado and Cuesta Vargas 2016

Bazzano et al. (2009 - HLCP intervention) and Chow et al. (2016 - Physical Activity Knowledge and Skills (PHPAKS) curriculum) explain the construct of social cognitive theory (SCT) used for their intervention:

Bazzano et al. (2009): „The HLCP conceptual model was based on Bandura's social cognitive theory of health behavior change.”

Figure 6 Conceptual model of the HLCP (Bazzano et al. 2009).

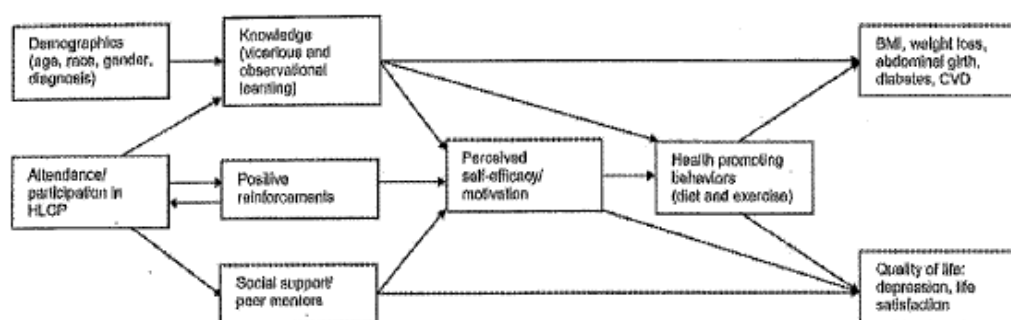


Figure 7: targeted constructs in the SCT and the intervention components (Chow et al. 2016)

Target construct according to SCT	Change objectives	Relevant behavior change components
Self-efficacy	Adults with ID think they are able to perform PA	<ul style="list-style-type: none"> Setting progressive goals in exercise program Providing model demonstration during exercise program
Attitude	Adults with ID enjoy participating in PA	<ul style="list-style-type: none"> Selecting exercise types according to the preference of the participants
Behavioral reward	Adults with ID feel stimulated and supported by others to perform PA	<ul style="list-style-type: none"> Prompt giving of rewards and praise for any attempt at performing PA during exercise program Presenting of certificate to participants who attended at least 80% of the exercise program
Social support	Adults with ID feel safe and comfortable to perform PA	<ul style="list-style-type: none"> Providing feedback on participants' progress during the education program Providing adequate knowledge (e.g., safety, how to seek help from others) through the education program Strengthening the knowledge and skills of staff at the residential group homes through staff training

Implementation – barriers and facilitators

Implementation is a crucial stage for an intervention. Some authors describe the implementation as well as barriers and facilitators.

Elinder et al. (2010, Stockholm intervention) evaluated barriers and facilitators related to the process. Explorative qualitative study are performed. “Interviews are often used when the aim is to gain a deep understanding of a phenomenon where not much is previously known, whereas observations are suitable to use when the aim is to explore what actually happens during the session.” Bergström et al. (2014, Stockholm intervention) as well as Sundblom et al. (2014, Stockholm intervention) shows the results crucial for implementation:

Figure 8: Barriers and facilitators in the implementation process (Bergström et al. 2014)

Theme	Creating an individualized supportive context			
Main categories	Individual characteristics	Pedagogical strategies	Interaction within the course	Structures
Sub-categories	Physical function	Trust and security	Participation	Planning and organizing
	Cognitive function	Strategies for various senses	Communication	Physical environment
	Motivation	Support and adaptation	Staff involvement	Routines for collaboration
	Self-efficacy			Support for course leaders

Figure 9: Important aspects for an implementation process (Sundblom et al. 2014)

<i>Supporting motivation for change</i>			
<i>Intervention characteristics</i>	<i>Individual commitment</i>	<i>Organisational capacity</i>	<i>Societal influences</i>
Compatibility and perceived needs	Competence and interest among staff	Work routines	Local policies and sanctions
A flexible and participatory approach	Interest among residents	Financial and staffing resources	Accessibility to a healthy environment
External input to staff and residents Support and preparation	Attitude of trustees and relatives	Work climate and leadership	Trends and media messages

Dixon et al. (2017) present key concepts of the Menu-Choice Program, which are important for a successful implementation:

- Relative advantage was described during training to express that the program advantages outweigh the negative outcomes of physical inactivity for the residents,
- Compatibility was an integral part of program design to make the program consistent with the practices and culture of the group homes system (e.g. using goals and check lists)

- Communicability was included in the design and implementation as we provided an easy step explanation of the program for staff to follow.
- Simplicity was a focus in the design to make it easy to follow and implement. A one-page step by step guide was created for ease.
- Trailability was the main purpose of the feasibility study where the group home had the opportunity to try the program prior to adopting in their agency.
- Time to implement the program was addressed by creating a program that would take minimal time to organize and implement.

Bodde et al. (2012 - Physical Activity Knowledge and Skills (PHPAKS) curriculum) point out the challenges of volitional control of people with ID and the influence for an intervention of promoting physical activity: „Many adults with ID do not have complete volitional control over their activity choices because of staffing constraints and transportation limitations. Therefore, it cannot be assumed that their intention to perform a behavior will directly lead to a behavior. For this reason, lessons were developed that emphasize activities adults with ID may actually have control over, such as activities that can be done at home using household items or while watching TV. Activities without the required supervision or transportation of a staff or family member were also included.

Type of physical activity and exercise

Table 8: Overview of types of physical activity and exercises and interventions

Physical activity	Name of intervention
Daily life activities (e.g. Walking, doing activities while watching tv)	HLCF intervention, Take 5, Physical Activity Knowledge and Skills (PHPAKS) curriculum, Lante et al. (2014), Pérez-Cruzado and Cuesta Vargas 2016, Steps to your health, Walk Well programme,
Exercises (but with action to integrate activities in daily life),	Step to your health (mentioned in lessons), Podgorski et al. (2014), HLCF intervention, Enhancement of Physical Activity Knowledge and Skills (PHPAKS) curriculum, Lante et al. (2014),
playing Nintendo Wii[™] Sports oder Sony Play Station's Dance Dance Revolution	Technology physical activity
Only physical activity mentioned	Stockholm intervention, menu choice
objective of understanding lifestyle, promoting health, giving motivation to promote health lifestyle behaviour, and increasing the performance of exercise.	Exercise and Nutrition Health Education Curriculum for Adults with Developmental Disabilities

The main activity are daily life activities and exercises with education lessons, how to integrate it in daily life. Sometimes it is not clear, what is actually meant with physical activity, because it is not mentioned clearly e.g. only physical activity (Stockholm intervention). This was already a problem for deciding in- or exclusion of studies.

Are competencies for physical activity of users* analyzed and if so, how?

Table 9: Development basis for interventions

6 Collating, summarizing, and reporting results

Name of intervention	Development (basis)
Step to your health	the completion of a written knowledge test, a fruit and vegetable assessment, and an exercise
Podgorski et al. 2004	fitness trainer spent 3 weeks at the site prior to the baseline evaluation getting to know the individuals, their physical limitations, their styles of communication, and their comfort levels with new things, new people, and other consumers..
Healthy Lifestyle Chance Program (HLCP)	Health assessment. A pertinent history, physical exam, and medical records review was performed by nurses and physicians. Referrals were made for needed primary care, preventive screenings, diagnostic tests, and specialty care. Preventive health screening recommendations were based on the U.S. Preventive Services Task Force Guide to Clinical Preventive Services, and recommendations for acute problems were based on physician judgment. Nurses followed up on all referrals to ensure that appointments were made and kept.
Lante et al. 2014	complete a Physical Activity Readiness Questionnaire (PAR-Q) and where concerns are identified by the PAR-Q, medical clearance will need to be obtained in order to participate in the study.
Exercise and Nutrition Health Education Curriculum for Adults with Developmental Disabilities	a medical report stating that they could do exercise.
Technology physical activity menu-choice	Medical Clearance: Must have, within the past 3 months, a signed physician permission form to beginning Each resident needed to complete a PAR-Q to determine physical activity readiness. The special activity needs sheet (SAN) was a one page communication aid with the goal of a safe and pleasant physical activity experience for the residents.

Intervention duration

The length of studies was very different, and range from 8 weeks to 12 – 15 months (Stockholm intervention). The most interventions were conducted not over 12 weeks (3 months) with exception menu-choice (16 weeks), HLCP intervention (7 months), Take 5 (12 months).

Needs of participants / Participative developmental approach

Four studies mentioned including the needs of participants, two of them asking staff/stakeholders and two of them asking people with ID themselves.

- Stockholm intervention (Elinder et al. 2010): „The themes were developed in discussions with managers of community residences and on the basis of their knowledge of the needs of the target group.“
- Menu choice (Dixon-Ibarra et al. 2017): „health promotion program guideline first step: identifyin needs of stakeholders in the group home-setting.“ – „Participation guidelines included stakeholder involvement in development and implementation of the program, considering the values of targeted group by developing the program based on feedback from community stakeholders and providing ample opportunities for personal choice within program materials” And the program itself: „it assists staff in including physical activity goals within the group home schedule. The staff and residents work together to develop weekly goals for residents activity.“

- Physical Activity Knowledge and Skills (PHPAKS) curriculum (Bodde et al. 2012): „A unique aspect of the program was the inclusion of adults with ID into the curriculum development and analysis process. A group of four adults with ID met twice and pilot tested two lessons of the program. In addition, they were asked to comment on the readability of the curriculum and the visual materials. A second draft of the curriculum was subsequently developed using the feedback from the reviewers and the pilot tests with four participants. In addition, process measures were created that matched each learning objective of the curriculum.“
- HLCP intervention (Bazzano et al. 2009): „communitybased participatory research (CBPR) principles and methods are conducted in partnership with community members to produce more effective and sustainable interventions that address the community's needs and desires. a project oversight team composed of individuals with developmental disabilities, parents of individuals with developmental disabilities, staff, academic researchers, and community-based professionals with extensive experience working with developmental disabilities, including a behavioral psychologist, a dietician, Fitness instructors, nurses, physicians, a physical therapist, an occupational therapist, a pharmacist, and public health professionals. This team met weekly to decide on all aspects of the program, including planning, curriculum development, implementation, evaluation, and dissemination. Academic researchers acted primarily as consultants providing information and facilitating discussion. Individuals with developmental disabilities also completed a series of leadership and health trainings to become peer mentors who collaborated to lead program activities.“

Involving organization / management

Menu choice (Dixon-Ibarra et al. 2017): „agency managers and program coordinator attended a three hour training session to get familiar with program and materials“

Stockholm intervention (Elinder et al. 2010): „Health ambassadors receives coaching by the research team and provide support to other staff members. - Network meetings are arranged four times during the intervention. The first meeting is an introductory meeting and following meetings focus on themes chosen by the ambassadors. - study circle [to discuss the process of the project) for staff are offered included in staff meetings.“

One study suggests to include physical activities in organizational policy:

Stockholm intervention (Sundblom et al. 2014): „However, this study has shown that there is room for further improvement of implementation strategies regarding the preparation phase and policy development to support health promotion.“

Health Education (for people with ID and staff)

In due to the different aims and intervention developmental approach, the health education varies a lot. In due to our research interest to state the art of intervention, there is only an overview and no comparison of the interventions.

Table 10: Overview Health Education for people with intellectual disabilities

Name of intervention	Health Education for people with intellectual disabilities
Step to your health	<p>The STYH intervention consisted of eight sessions, each focused on a target issue, and class participation included discussion, practice time, group activities, and healthy snacks for the participants. Transportation was provided and sessions were held in a room provided by the disability service agency in the local area where the participants lived.</p> <p>The beginning of each session was used to summarize and discuss the previous lesson, answer questions, and bring up successes and problems. The sessions were organized around the following topics during the eight weeks:</p> <ul style="list-style-type: none"> • Lesson 1 Nutrition I (emphasis on fruits and vegetables) • Lesson 2 Nutrition II (emphasis on whole grains and portion size) • Lesson 3 Exercise • Lesson 4 Stress management • Lesson 5 Changing your way of thinking • Lesson 6 Communication styles (asserting preferences) • Lesson 7 Complications of obesity • Lesson 8 Behaviour management <p>Her vocabulary and the learning materials were concrete, and every lesson was infused with examples and exercises. The spacing of the sessions, at one-week intervals, was the desired frequency stated by participants who assisted with the design of the intervention.</p>
Healthy Lifestyle Chance Program (HLCP)	<p>ducation and exercise sessions. Each class included 50 minutes of interactive health education, a 10-minute healthy snack break, and 1 hour of supervised physical activity. Provier led interactive activities that supplemented didactic material. Based on client feedback from the focus groups, core aspects of the final program included: (1) client peer mentoring; (2) interactive health education; (3) supervised physical activity; (4) behavioral modification; (5) one-on-one health management education and advocacy; (6) clinical support; and (7) a supportive social network.</p>
Stockholm intervention	<p>Health ambassadors get in contact with residents and plan physical activity</p>
Take 5	<p>Each session lasted 40-60 min. TAKE5 compromised nine sessions and followed a structured format, with specific defined content to be covered for each session. The intervention was delivered by two Behavioural methods are incorporated in every session (goal setting and self-monitoring are central and were added by methods to maintain participants and carer motivation, cue avoidance, stimulus control and problem solving. Focus on diet, but contains physical activity as an important factor of this intervention. Sports and ecercise information was given to each participant and carer on local leisure facilities and clubs with accessible sports and exercise groups/classes.</p>
Physical Activity Knowledge and Skills (PHPAKS) curriculum	<p>to increasing PA knowledge, skills, and actual control, each lesson was designed to address one of three behavioral constructs of the theory of planned behavior. For example, perceived behavioral control was incorporated into four of the eight lessons. Each of the pictures used in these pictorial instructions showed a person with ID demonstrating the skill. Second, the curriculum included short interactive video clips designed to demonstrate PA concepts. The video clips were integrated into a split-screen video demonstration for the instructor to use during the class. For example, the video for Lesson 1 showed a participant playing basketball and a participant sitting and listening to music. After viewing the splitscreen display, participants were to be asked in class to correctly identify which video demonstrates PA. Third, each week, every participant had a photo taken of them demonstrating the skill they acquired in class. Participants were asked to save each picture that they would keep to serve as a lesson content memory tool (e.g., a picture taken of them properly using their new pedometer). two sessions of the curriculum were designed to address the physical, mental, and emotional benefits of PA.</p> <p>Several activities were included in the current curriculum to help increase social support skills for PA participation. Multiple role-playing activities were added: for example, participants practiced inviting a friend to go for a walk with them. They were also made aware of community opportunities for team sports such as the locally available Special Olympics teams in which to participate at no cost.</p>

6 Collating, summarizing, and reporting results

	As such, one lesson would equip people with ID with the necessary knowledge and skills to safely participate in PA and address the concerns of hydration, pain, and weatherappropriate dress.
Exercise and Nutrition Health Education Curriculum for Adults with Developmental Disabilities	See chapter d) curriculum
Walk Well	Walk Well involved three face-to-face meetings over a 12 week period between participants, carers where appropriate, and a walking advisor. Prior to the start of the intervention the walking advisor received training on communicating with adults with intellectual disabilities, motivational interviewing and delivering physical activity consultations. The physical activity consultation had a semi-structured format and a personcentred approach to ensure it was individualised to the needs of the participant with intellectual disabilities.
Pérez-Cruzado and Cuesta Vargas 2016	<p>a one hour session of physical activity where the therapist provided educational advice to people with an intellectual disability to carry out more physical activity. The tips given in the educational advice are: tips given in the educational advice:</p> <p>Tips for going around town:</p> <ul style="list-style-type: none"> • Walk to the shops, post office, school, neighbours. • Park in the furthest space in the car park. • Walk around the waiting room, airport or anywhere where you have to wait. • Practise 'active shopping' by first walking around the block and looking before you start buying. <p>Tips for home:</p> <ul style="list-style-type: none"> • Hide your remote and change channels as you used to. • Put on some lively music while you are doing housework. • Get up and walk around during television commercials. • Walk the dog. <p>Tips for family and friends:</p> <ul style="list-style-type: none"> • Walk, run and play actively with the kids. • Go hiking with family and friends, so you are enjoying social time while exercising. • Make time for a regular 'family walk'. • Plan active holidays and getaways.
menu-choice	<p>it assists staff in including physical activity goals within the group home schedule. The staff and residents work together to develop weekly goals for residents activity. The program includes a resource binder, weekly scheduling sheets, visual calendar and post it activity pictures for the residents. The resource binder includes resources for staff to learn about physical activity, activity examples, information about goal setting, and guidelines for specific disabilities within the group home setting. The calendar allow residents to post picture of their activity across the week and check off when they complete their goals.</p> <p>contents of intervention:</p> <ol style="list-style-type: none"> 1 Step by step guide to menu-choice 2 physical activity education section 3 residents special activity needs sheet 4 goal setting education section 5 resident choice activities 6 menu-Choice activity modules 7 Menu-Choice Activity progressions 8 weekly activity schedule (goal setting sheet) 9 residents visual activity calendar 10 goal evaluation sheets 11 finding motivation activities 12 staff and resident activity champions

Health Education for staff/managers:

Steps to your health (Mann et al. 2006): „staff members employed by community disability service providers, who were given training and technical support for conducting the program by two university professionals“

Stockholm intervention (Elinder et al. 2010): „The health ambassador receives coaching by the research team and provide support to other staff members. study circle for staff: included in staff meetings.“

Enhancement of Physical Activity Knowledge and Skills (PHPAKS) curriculum (Chow et al. 2016): „The intervention included a staff training component. As social support can be provided by the staff of the group homes, the content of the 2-hour staff training session included increasing cognitive awareness of the importance of providing physical activities to the residents, the use of behavioral change strategies in promoting physically active lifestyles, and the practical skills needed to lead physical exercises.“

Nutritional and Activity Education for people with intellectual disability (Yilmaz et al. 2014): education program with four lessons offered to the families/care givers.

Menu Choice (Dixon-Ibarra et al. 2017): „it assists staff in including physical activity goals within the group home schedule. The staff and residents work together to develop weekly goals for residents activity. Agency managers and program coordinator attended a three hour training session to get familiar with program and materials, - program coordinators trained support staff over a two-week period.“

Providers for people with intellectual disability

Table 11: Overview of providers

Name of intervention	Provider
Step to your health	The classes were taught by staff members employed by community disability service providers, who were given training and technical support for conducting the program by two university professionals.
Podgorski et al. 2004	fitness trainer
Healthy Lifestyle Chance Program (HLCP)	Professionals with expertise in developmental disabilities taught sessions with assistance from peer mentors,
Stockholm intervention	Health education for residents: health educator from "Studieförbundet Vuxenskolan" using the educational material "Hälsokörkortet" (Driver's licence for health). Health ambassadors: The health ambassador receives coaching by the research team and provide support to other staff members. study circle for staff: included in staff meetings
Take 5	health professionals who had experience of working with individuals with intellectual disability - a dietitian and a medically qualified sports medicine graduate
Physical Activity Knowledge and Skills (PHPAKS) curriculum	instructor followed a script (Enhancement: Exercise program: instructor who has a physical education diploma with sport coaching experience and experience in working with adults with ID Educational program and staff training: not mentioned (researcher?)
Lante et al. 2014	Intervention group 1: Exercise specialists from the University of Sydney and supervising of physical activity by disability staff Intervention group 2: Exercise specialists from the University of Sydney
Exercise and Nutrition Health Education	Education program from researchers

Curriculum for Adults with Developmental Disabilities	
Walk Well	walking advisor
Technology physical activity	Researcher
Pérez-Cruzado and Cuesta Vargas 2016	therapist
menu-choice	- researcher to agency managers and program coordinators - program coordinators to staff - staff work together with residents

Interesting for an intervention are Health ambassadors (Stockholm intervention), which are trained staff, and peer mentors (HLCP intervention) - For example, peer mentors modeled effective interactions during a physician visit, and they demonstrated safe cooking techniques or an exercise video created by the peer mentors (Bazzano et al. 2009).

„Individuals with developmental disabilities also completed a series of leadership and health trainings to become peer mentors who collaborated to lead program activities. - Peer mentors. Eleven adults with developmental disabilities were hired as peer mentors. Clients, client rights advocates, and parents of individuals with developmental disabilities introduced the concept of peer mentors to the team, believing peers were better equipped than professionals to support others who face similar challenges, life experiences, and barriers to health. Peer mentors were recruited through flyers, job advertisements, community presentations, and referrals from WRC¹¹ case managers and community organizations serving individuals with developmental disabilities. All potential candidates underwent an application process and were interviewed by team members. Peer mentors were selected based on leadership potential and enthusiasm and/or life experience regarding healthy lifestyles. Peer mentors collaborated on program planning, curriculum revision, and participant recruitment. The HLCP was piloted with the peer mentors, who provided recommendations on logistic issues (when and where to hold classes); educational topics; developmental level; need for repetition and visual tools; sensitivity; potential limitations; and ways to adapt the program for the larger group. Peer mentors suggested the program be conducted at WRC rather than at other locations in the community because it was familiar, accessible, and centrally located, with a bus stop nearby. Peer mentors received training on health and fitness, leadership, and motivational strategies so that they could serve as leaders, teachers, and role models for healthy behavior. They made reminder phone calls to participants, led physical activity sessions, prepared healthy snacks, and help to

¹¹ WRC = Westside Regional Center

facilitate review sessions and evaluation assessments.' Peer mentors also presented program results at community meetings and academic conferences alongside researchers“ (Bazzano et al. 2009).

Dixon et al. (2017 - Menu Choice) stated following notes:

- “ there was no staff that worked consistently (staff turnover and limited staff)
- policy level not taken into account
- to note, that staff and program coordinators, which themselves had high BMI and low activity levels, may not have found value in implementing an activity program (role model)”

Home visits and one-on-one sessions

Step to your health (Mann et al. 2006): „All participants were offered two home visits to establish an individual exercise program (e.g., walk around the neighborhood with the individual to show the recommended pace and distance to walk), develop a dietary plan (e.g., look in the refrigerator and cabinets to assess daily dietary patterns), and make a grocery store visit to identify healthy choices.“

Take 5 (Melville et al. 2011): „Take5 is an individual intervention involving family or paid carers to support participants, where appropriate. It took place in each individual's home environment.“

Walk Well (Melville et al. 2015): „Walk Well involved three face-to-face meetings over a 12 week period between participants, carers where appropriate, and a walking advisor. Prior to the start of the intervention the walking advisor received training on communicating with adults with intellectual disabilities, motivational interviewing and delivering physical activity consultations. The physical activity consultation had a semi-structured format and a personcentred approach to ensure it was individualised to the needs of the participant with intellectual disabilities.“

Melville 2011 (Take 5): „An individual intervention was believed to to be more likely to be accessible to all adults with ID. ... Although the changes in moderate-to-vigorous levels of physical activity were not significant, participants made clinically relevant changes to their levels of sedentary behaviour and light-intensity physical activity.”

Melville et al. (2016) comments: “The additional barriers to physical activity experienced by adults with intellectual disabilities mean that decision making and actions are most often expressed in the context of existing personal relationships and the majority of participants in

Walk Well were supported by family or paid carers during walking. However, many participants and carers reported difficulties finding time to walk together. (therefore must be guideline) even when social care support is available, it is often not funded at a level that allows paid carers to support adults with intellectual disabilities to be physically active.” And

“Additional support from external organisations could reduce the social capital/ networks barriers to adults with intellectual disabilities participating in community activities caused by reductions in social care support. For example, social enterprises, volunteer organisations and buddy programmes may all have a role to play in supporting adults with intellectual disabilities to be more active.”

How is motivation of the participants discussed?

Podgorski et al. (2004) discuss factors, that influence the selection of activities: “Participants were encouraged to try the fitness challenges prior to the baseline assessment. A wide variety of factors influenced the selection of activities within these sessions, including the broad range of cognitive abilities among the participants; fear of the unknown and the challenge of change, safety issues, variability in learning times, medical issues, tolerance for interpersonal contact, communication abilities, ability to be self-directed, and cognitive levels, creation of a perception of “fun” as opposed to “work” or a “test”; space constraints, and cost.”

Stockholm intervention (Sundblom et al. 2014): “The overarching theme emerged out of the contents of the main categories. It describes the importance of supporting motivation for change among managers, caregivers and residents when implementing a health intervention in community residences. The intervention needs to be designed to support the participants to find their own motivation to engage in the project, as stated by one of the health managers;

I would say this is the key, I mean to be able to make someone else feel motivated. From the perspectives of managers and health ambassadors, both caregivers and residents have to find their individual motivation to make changes. Furthermore, the support has to be tailored to each residence as well as for each individual, taking their specific needs and preferences into account.”

Take 5 intervention include methods to maintain participant and carer motivation, due avoidance, stimulus control and problem solving.

Walk Well: “Prior to the start of the intervention the walking advisor received training on communicating with adults with intellectual disabilities, motivational interviewing and delivering physical activity consultations. Participants were also motivated to work towards

their end of study certificate. ‘We could see [the step count] and say “Look how many steps you did today”. If he got higher the next day he was quite proud of himself.’ (Paid carer 1) ‘He enjoyed the fact that he reached his goal to get the certificate. That’s right, he completed something. He always likes to finish things when he starts them. Sometimes in X’s life it is difficult for him to complete things.’ (Family carer)”

Bazzano et al. (2009) includes the needs and on this way the motivation in the development:

“For example, based on insights from team members with developmental disabilities, the program's exercise component was not integrated into existing community health clubs because of concerns that participants would feel awkward or out-of-shape if surrounded by typical Los Angeles health club members.”

Pérez-Cruzado and Cuesta Vargas (2016): “The educational Intervention included in physical activity is of great importance since it is one of the main components that motivates people with intellectual disabilities to the realisation of physical activity.”

And Harris et al. (2017) discuss it for staff: “Several explanations were presented for poor engagement by carers, including: low morale and changes in the working environment; the burden of paperwork and other administrative duties for participants; lack of consistency in shift patterns; lack of communication between carers; and being responsible for more than one individual with intellectual disabilities.

How the interventions are evaluated?

The evaluation of the interventions was very different according to the specific of the intervention, see therefore attachment 3 for more details. In this chapter, we’re give a short overview of interesting approaches and challenges for participants to participate in the evaluation:

HLCP intervention (Bazzano et al. 2009): “Evaluation. At the request of team members, researchers performed a literature review of published weight loss programs to guide development of outcome measures and program evaluation. The team reviewed all evaluation tools for developmental appropriateness, relevance to research questions, ease of administration, and acceptability to clients. All team members made descisions on outcome measures and tools using a democratic process. Outcomes were assessed at baseline and at 7 months (program completion). In addition to the outcomes described below; health knowledge questionnaires were self-administered with help from peer mentors and project staff, and the Beck Depression Inventory®-II (BDI-II) 23 was administered by mental health professionals.

Knowledge questionnaire results are not reported, because peer mentors and support staff mistakenly assisted participants with answers. The results of BDI-II are not reported due to participant difficulty in comprehending and completing the tool.“

As well as Walk Well programme (Matthews 2016): “Feedback from participants, carers and the study team identified the participant burden of the data collection questionnaires.“

Steps to your health (Mann et al. 2006) therefore help participants as follows: “The instructors read the questions to each participant and talked with the individual about the concepts embedded within each question. For example, when the question pertained to exercise frequency, the instructor talked to the participant about days of the week to determine whether the individual understood these concepts. If they did not, the interviewer asked the person who brought the individual (e.g., parents, group home staff) if he or she could answer for them; thus, for some participants, informants were used. In all cases, the informant-reported information was shared with the study participant to assess whether or not he or she agreed.

Podgorski et al. (2004) conducted a One-year-follow-up. „After 1 year, many of the participants continued to improve in one or more aspects of physical function performance.“ A follow-up seems to be interesting for an intervention evaluation and meaningful to assess the sustainability of an intervention.

Ethical statements

Sunblom et al. (2014): “Ethical dilemmas and conflicts between providing support and respecting autonomy are well-known challenges in this setting, and also in this study, there was a great need to discuss these issues.”

Which is discussed in more detail:

Matthews et al. (2016): „Finally, the complex issue of ‘freedom of choice’ needs careful consideration for adults with intellectual disabilities. One participant reported feeling ‘pestered’ or ‘nagged’ by their day centre staff into joining the study. In line with Good Clinical Practice no individual should feel pressured to participate in research. Autonomy is one of the four cornerstones of good ethical conduct; along with beneficence, non-maleficence and justice. However, exercising autonomy and reaching an informed decision requires deliberation, understanding and decisional balance; cognitive skills that some adults with intellectual disabilities may not have. To make an informed lifestyle choice they need to effectively consider the benefits and risks of positive and negative behaviour [46]. This led to debate by carers on ‘freedom of choice’ and ‘health improvement’ i.e. Was encouraging individuals who

lacked motivation a bad thing? Or was not encouraging individuals, because they lacked motivation, a bad thing? This uncertainty over ‘freedom of choice’ was demonstrated in our study where participants, supported by carers, were sometimes entrenched in poor lifestyle behaviours, for example, eating several boxes of chocolates or using a taxi for a distance of 200m.“

Bergström et al. (2014): “The interactional patterns during course sessions indicated dominance from the course leader. This has previously been identified in classroom situations as well as between caregivers and people with intellectual disabilities in regular conversations. Some of the dominance can be explained by the tutorial role of a course leader, but that does not exclude possibilities for interaction-based learning. This was shown by course leader F, who based the educational strategies on the contributions of the participants, which resulted in livelier communication and interaction in these groups than in the other groups. In the smallest and largest groups, interactional difficulties were observed, which can probably be attributed to both group size and pedagogical strategies. However, ideal group size and similar levels of ability in a course must be weighed against the advantage of holding the course in a familiar social context with greater possibilities of support in daily routines.

Realization of activity in everyday life

Bergström et al. (2014 – Stockholm intervention): “The health course offered good opportunities for the participants to increase health literacy in a group activity where they, without the presence of caregivers, got the possibility to practice autonomy. The course focused more on health literacy than on the empowerment process though. *There was a lack of support within the social and physical environment, to adequately support the use of new skills within everyday life.* Challenges that have to be addressed when implementing health education for this target group in the future include improved adaptation to individual characteristics, pedagogical strategies that meet different learning styles and include participation in every part of the process and planning for well-functioning structures. To increase health related behaviours it is important to improve health literacy as well as supporting the empowerment process. This might be achieved by creating an individualized supportive context in collaboration with caregivers and relatives.

6.5 Curriculum

Marks et al. (2010) offer a Health Education Curriculum for Nutrition and Exercise. Although, the main focus is on exercise, there are lessons included important to our research interest. Next to the exercise and nutrition classes, health education classes are an important aspect of the

curriculum. Those classes are intended for 3 days per week for 1 hour over 12 weeks, with a size of 6 – 10 participants. It is also developed for people with severe/profound intellectual disabilities as well for a variety of physical disabilities. „The lessons consisted of activities helping participants to understand their attitudes toward health, exercise and food, find exercises that they like to do and set goals, gain skills and knowledge about exercises and healthy eating, support each other during the course of the class; and identify in their community where they could exercise regularly.“

„The curriculum is based on Bandura’s Social Cognitive Theory and the five stages of change in the Transtheoretical Model of behavior Change: precontemplation [Not interested], contemplation [thinking about it], preparation [planning], action [doing], and maintenance [still doing].“

Before starting the programme, following steps should be considered:

1. Obtain permissions from a health care provider for each participant
2. Encourage participants to do physical activities throughout the day (daily routines)
3. Make sure that the program is based on sound and tested theory (see above)
4. Teach participants to exercise a minimum of 3 days per week for at least 30 minutes.
5. Keep the program fun and rewarding.
6. Foster fitness among staff and caregivers.

Above that, it is considered that „maximum individual involvement in the planning and implementation of exercise and nutrition goals“ should be reached. Other techniques for the curriculum are:

Problem solving techniques, Conflict resolutions, Role Playing, Using Open Ended Questions, give attention to individual learning styles, field trip activities, incorporating newsletters and evaluating changes in participants.

The curriculum offered instructions for the lessons provider as well as materials for each lesson in easy language and with pictures for following lessons:

Unit 1. Physical Activity and Nutrition: Making Healthy Choices

Lesson 1: What Is Health?

Lesson 2: What Is Physical Activity?

Lesson 3: Things to Do Before We Exercise

Lesson 4: Exercise Is Good

Lesson 5: What Do Different Exercises Do for My Body?

Lesson 6: Good Nutrition

Lesson 7: How Much Energy Does It Take?

Lesson 8: Healthy Choices/Self-Advocacy

Unit 2: Changing Lifestyle: What Are the Things We Do?

7) Limitations and strength of this review

Lesson 9: What Do I Think of Me?
Lesson 10: What Is My Heart Rate?
Lesson 11: What Is My Blood Pressure?
Lesson 12: What Exercises Do I Like in My Community?
Lesson 13: What Are Good and Bad Influences?
Lesson 14: Am I Drinking Enough Water?
Lesson 15: What Foods Do I Like to Eat?
Lesson 16: How About My Medications and Exercise?
Unit 3: Making Lifestyle Changes: Setting Goals
Lesson 17: Things to Remember When Exercising
Lesson 18: Community Fitness Center Visit: Using Exercise Machines Safely
Lesson 19: How to Breathe When We Exercise
Lesson 20: Why Do We Clean Equipment?
Lesson 21: Nutrients We Need
Lesson 22: Exercise Plans: Becoming More Active
Lesson 23: Nutrition Plan: Making a Menu
Unit 4: Lifestyle Changes: Doing My Program
Lesson 24: Wants and Needs: Doing Different Exercises in My Community
Lesson 25: What Is Good Pain and Bad Pain?
Lesson 26: How Does Sleep Affect Physical Activity?
Lesson 27: Negotiation and Compromise
Lesson 28: Can I Exercise If I Feel Sick?
Lesson 29: Am I Meeting My Goals?
Lesson 30: Rewarding Myself
Unit 5: New Lifestyle: Keeping My Program Going
Lesson 31: Restructuring My Environment
Lesson 32: Getting Back on Track
Lesson 33: Creating an Exercise Video
Lesson 34: Reviewing Our Goals to Stay Connected
Lesson 35: Putting It All Together
Lesson 36: Finishing Touches on Our Video
Lesson 37: Graduation Party

7) Limitations and strength of this review

We searched numerous databases in this scoping review, but we had no access to one potentially important databases (Sport-Disucs). Furthermore, we did not perform a hand search on important journals (like Journal of Intellectual Disability Research or Journal of Applied Research in Intellectual Disabilities). However, the journals are indexed in Medline and the main articles on the topic should be included. In contrast to us, the included systematic reviews take these data sources into account and we browse through those references, so that we assume, that no relevant intervention is missing. Our decisions for inclusion and exclusion are very subjective. For example, we include the curriculum (Marks et al. 2010) but not studies working with this curriculum, because the main interest was testing exercise and the compliance of the program. We also not include the curriculum „Health Matters for People with Developmental Disabilities: Creating a Sustainable Health Promotion Program“ also from Marks et al. (2010), which belongs together, but have a different approach. On the other side, we include Coyle et al. 2016 because of statements of daily life actions with technology but excluded other interventions with technology like XBOX due to their focus. Podgorski et al (2004) only included because of the 1-year-follow up, because in this field long-term-measuring are very

rarely. Team discussions cannot be described in detail, however, to our research interest, we think that we have a good selection for an own development and evaluation of an intervention. The decision for the year selection (20 years range) is only based on assumption. However, we think that we have interventions taken into account also according to the latest development in research, health systems and approach to people with intellectual disability. Because we do not identify articles, which are included in overviews/systematic reviews, there is risk to take some studies are more often into account (e.g. in review and studies). Nevertheless, we described the studies with another focus than the overviews/systematic reviews, therefore, it seems to be beneficial for our aim to have a tool-box (pool of ideas) with basic concepts and tested strategies for our own development. At least, we do not describe outcomes and quality of studies. But, we discussed it in the chapter 6.3 Systematic reviews and it seems, that it is a main problem in research with people with intellectual disability. In this funding period of our research project the main focus lies on basic research, development and validating the intervention. Therefore, it is not relevant for us, but will be discussed at the end for a further research period to evaluate our intervention.

8) Implication for our research project

In this detailed results presentation, we described the execution and findings of a scoping review. We have sought to answer the primary question “What is the state of the art in interventions to promote physical activities addressing daily life situations for people with intellectual disabilities?” For this, we mapped the data for each category, except the curriculum and answered our secondary research questions. Categories also be added if they are important for our own intervention development. In this chapter, we conclude by briefly summarizing implications the findings for our research project.

With this work, we draw the current state of the art in interventions to promote physical activity in daily life of people with intellectual disability. It is important for the project to know what already exists and what can work for us. This lead to the point, that we have a tool box (pool of ideas) for an own development like theoretical basement, how people with ID and staff are educated etc. Above that, we found further important aspects for our development like barriers and facilitator, ethics statements and so on that we have to take into account for our development of an own intervention. In this paper, we have omitted to describe central/key messages of the findings or discuss them. This is in due to the mentioned aim of this paper. The aim of this paper is to have a tool-box with basic concepts and tested strategies for our own development. Above that, we also would like to achieve a good transparency on which data basis our

intervention will be founded. While writing this detailed results presentation the analyzing of individual movement experiences as well as desires and needs of the people with intellectual disability regarding the promotion of their own physical activity via methodological triangulation is not finished. Our development will base on those results and with them we can decide, which works best for the own intervention. We will discuss this with future users (people with intellectual disability) in a participatory approach and also with staff members. The development of the intervention will be described in the handbook of the förages-network, which will be published in 2021). In this contribution it will be described, which results are taken into account for the own intervention.

9) References of included articles

Included overviews

Lotan, Meir (2007): Quality physical intervention activity for persons with Down syndrome. In *THE SCIENTIFIC WORLD JOURNAL* 7, pp. 7–19. DOI: 10.1100/tsw.2007.20.

Stanish, Heidi I.; Frey, Georgia C. (2008): Promotion of physical activity in individuals with intellectual disability. In *SALUD PUBLICA DE MEXICO* 50 (2), S178-S184. DOI: 10.1590/S0036-36342008000800011.

Stanish, Heidi I.; Temple, Vivienne A.; Frey, Georgia C. (2006): Health-Promoting Physical Activity of Adults with Mental Retardation. In *Ment Retard Dev Disabil Res Rev* 12 (1), pp. 13–21. DOI: 10.1002/mrdd.20090.

Included systematic reviews

Bartlo, Pamela; Klein, Penelope J. (2011): Physical activity benefits and needs in adults with intellectual disabilities: Systematic review of the literature. In *Am J Intellect Dev Disabil* 116 (3), pp. 220–232. DOI: 10.1352/1944-7558-116.3.220.

Brooker, Katie; van Dooren, Kate; McPherson, Lyn; Lennox, Nick; Ware, Robert (2015): A systematic review of interventions aiming to improve involvement in physical activity among adults with intellectual disability. In *J Phys Act Health* 12 (3), pp. 434–444. DOI: 10.1123/jpah.2013-0014.

Harris, L.; Hankey, C.; Murray, H.; Melville, C. (2015): The effects of physical activity interventions on preventing weight gain and the effects on body composition in young adults with intellectual disabilities: systematic review and meta-analysis of randomized controlled trials. In *CLINICAL OBESITY* 5 (4), pp. 198–210. DOI: 10.1111/cob.12103.

Hassan, N. M.; Landorf, K. B.; Shields, N.; Munteanu, S. E. (2019): Effectiveness of interventions to increase physical activity in individuals with intellectual disabilities: a systematic review of randomised controlled trials. In *Journal of intellectual disability research : JIDR* 63 (2), pp. 168–191. DOI: 10.1111/jir.12562.

Heller, Tamar; Sorensen, Amy (2013): Promoting Healthy Aging in Adults with Developmental Disabilities. In *Developmental disabilities research reviews* 18 (1), pp. 22–30. Available online at <http://dx.doi.org/10.1002/ddrr.1125>.

PITCHFORD, E. ANDREW; Dixon-Ibarra, Alicia; Hauck, Janet L. (2018): Physical activity research in intellectual disability: A scoping review using the Behavioral Epidemiological Framework. In *Am J Intellect Dev Disabil* 123 (2), pp. 140–163. DOI: 10.1352/1944-7558-123.2.140.

Temple, Vivienne A.; Frey, Georgia C.; Stanish, Heidi I. (2017): Interventions to promote physical activity for adults with intellectual disabilities. In *SALUD PUBLICA DE MEXICO* 59 (4), pp. 446–453. DOI: 10.21149/8218.

Willems, Mariël; Hilgenkamp, Thessa I. M.; Havik, Else; Waninge, Aly; Melville, Craig A. (2017): Use of behaviour change techniques in lifestyle change interventions for people with intellectual disabilities: A systematic review. In *Research in Developmental Disabilities: A Multidisciplinary Journal* 60, pp. 256–268. DOI: 10.1016/j.ridd.2016.10.008.

Willems, Mariël; Waninge, Aly; Hilgenkamp, Thessa I. M.; van Empelen, Pepijn; Krijnen, Wim P.; van der Schans, Cees P.; Melville, Craig A. (2018): Effects of lifestyle change interventions for people with intellectual disabilities: Systematic review and meta-analysis of randomized

controlled trials. In *Journal of Applied Research in Intellectual Disabilities* 31, pp. . 949-961. DOI: 10.1111/jar.12463.

Included studies:

Bazzano, Alicia T.; Zeldin, Ari S.; Diab, Ida R. Shihady; Garro, Nicole M.; Allevato, Nathalia A.; Lehrer, Danise; Team, W. Project Oversight R.C. (2009): The Healthy Lifestyle Change Program A Pilot of a Community-Based Health Promotion Intervention for Adults with Developmental Disabilities. In *AMERICAN JOURNAL OF PREVENTIVE MEDICINE* 37 (6), S201-S208. DOI: 10.1016/j.amepre.2009.08.005.

Bergström, Helena; Hagstromer, Maria; Hogberg, Jan; Elinder, Liselotte Schafer (2013): A multi-component universal intervention to improve diet and physical activity among adults with intellectual disabilities in community residences: A cluster randomised controlled trial. In *Research in Developmental Disabilities: A Multidisciplinary Journal* 34 (11), pp. 3847–3857. DOI: 10.1016/j.ridd.2013.07.019.

Bergström, H.; Elinder, L. S.; Wihlman, U. (2014): Barriers and facilitators in health education for adults with intellectual disabilities--a qualitative study. In *Health Education Research* 29 (2), pp. 259–271. DOI: 10.1093/her/cyt111.

Bodde, Amy E.; Seo, Dong-Chul; Frey, Georgia C.; van Puymbroeck, Marieke; Lohrmann, David K. (2012): The effect of a designed health education intervention on physical activity knowledge and participation of adults with intellectual disabilities. In *AM J HEALTH PROMOT* 26 (5), pp. 313–316. DOI: 10.4278/ajhp.100408-ARB-112.

Chow, Bik C.; Huang, Wendy Y. J.; Choi, Peggy H. N.; Chien-yu Pan (2016): Design and methods of a multi-component physical activity program for adults with intellectual disabilities living in group homes. In *J EXERC SCI FITNESS* 14 (1), pp. 35–40. DOI: 10.1016/j.jesf.2016.06.002.

Coyle, Catherine; Shank, John; Wilhite, Barbara; Komaroff, Eugene (2016): Using Technology for Physical Activity: A Pilot Study on Heart Rate Response and Game Preferences. In *ANNUAL RECREATION* 23, pp. 31–40. Available online at <http://search.ebscohost.com/login.aspx?direct=true&db=cin20&AN=124714713&site=ehost-live>.

Dixon-Ibarra, Alicia; Driver, Simon; VanVolkenburg, Haley; Humphries, Kathleen (2017): Formative evaluation on a physical activity health promotion program for the group home setting. In *Eval Program Plann* 60, pp. 81–90. DOI: 10.1016/j.evalprogplan.2016.09.005.

Elinder, Liselotte Schafer; Bergstrom, Helena; Hagberg, Jan; Wihlman, Ulla; Hagstromer, Maria (2010): Promoting a healthy diet and physical activity in adults with intellectual disabilities living in community residences: Design and evaluation of a cluster-randomized intervention. In *BMC PUBLIC HEALTH* 10. DOI: 10.1186/1471-2458-10-761.

Ewing, Gary; McDermott, Suzanne; Thomas Koger, Marlo; Whitner, Wendy; Pierce, Kristen (2004): Evaluation of a Cardiovascular Health Program for Participants with Mental Retardation and Normal Learners. In *Health Education & Behavior* 31 (1), pp. 77–87. Available online at <http://dx.doi.org/10.1177/1090198103259162>.

Harris, Leanne; Hankey, Catherine; Jones, Nathalie; Pert, Carol; Murray, Heather; Tobin, Janet et al. (2017): A cluster randomised control trial of a multi-component weight management programme for adults with intellectual disabilities and obesity. In *BR J NUTR* 118 (3), pp. 229–240. DOI: 10.1017/S0007114517001933.

- Lante, Kerrie; Stancliffe, Roger J.; Bauman, Adrian; van der Ploeg, Hidde P.; Jan, Stephen; Davis, Glen M. (2014): Embedding sustainable physical activities into the everyday lives of adults with intellectual disabilities: a randomised controlled trial. In *BMC PUBLIC HEALTH* 14. DOI: 10.1186/1471-2458-14-1038.
- Mann, Joshua; Zhou, Huafeng; McDermott, Suzanne; Poston, Mary Beth (2006): Healthy Behavior Change of Adults With Mental Retardation: Attendance in a Health Promotion Program. In *Am J Ment Retard* 111 (1), pp. 62–73. DOI: 10.1352/0895-8017(2006)111[62:HBCOAW]2.0.CO;2.
- Matthews, Lynsay; Mitchell, Fiona; Stalker, Kirsten; McConnachie, Alex; Murray, Heather; Melling, Chris et al. (2016): Process evaluation of the Walk Well study. A cluster-randomised controlled trial of a community based walking programme for adults with intellectual disabilities. In *BMC PUBLIC HEALTH* 16, p. 527. DOI: 10.1186/s12889-016-3179-6.
- McDermott, Suzanne; Whitner, Wendy; Thomas-Koger, Marlo; Mann, Joshua R.; Clarkson, John; Barnes, Timothy L. et al. (2012): An Efficacy Trial of "Steps to Your Health", a Health Promotion Programme for Adults with Intellectual Disability. In *Health Education Journal* 71 (3), pp. 278–290. Available online at <http://search.ebscohost.com/login.aspx?direct=true&db=eric&AN=EJ966104&site=ehost-live>.
- Melville, Craig A.; Boyle, Susan; Miller, Susan; Macmillan, Susan; Penpraze, Victoria; Pert, Carol et al. (2011): An open study of the effectiveness of a multi-component weight-loss intervention for adults with intellectual disabilities and obesity. In *The British journal of nutrition* 105 (10), pp. 1553–1562. DOI: 10.1017/S0007114510005362.
- Melville, Craig A.; Mitchell, Fiona; Stalker, Kirsten; Matthews, Lynsay; McConnachie, Alex; Murray, Heather M. et al. (2015): Effectiveness of a walking programme to support adults with intellectual disabilities to increase physical activity: Walk well cluster-randomised controlled trial. In *Int J Behav Nutr Phys Act* 12. DOI: 10.1037/t20676-000;
- Pérez-Cruzado, David; Cuesta-Vargas, Antonio I. (2016): Changes on quality of life, self-efficacy and social support for activities and physical fitness in people with intellectual disabilities through multimodal intervention. In *Eur J Spec Needs Educ* 31 (4), pp. 553–564. DOI: 10.1080/08856257.2016.1187876.
- Podgorski, Carol Ann; Kessler, Karen; Cacia, Barbara; Peterson, Derick R.; Henderson, C. Michael (2004): Physical activity intervention for older adults with intellectual disability: Report on a pilot project. In *Mental Retardation: A Journal of Practices, Policy and Perspectives* 42 (4), pp. 272–283. DOI: 10.1352/0047-6765(2004)42<272:PAIFOA>2.0.CO;2.
- Sundblom, Elinor; Bergström, Helena; Ellinder, Liselotte Schäfer (2015): Understanding the implementation process of a multi-component health promotion intervention for adults with intellectual disabilities in Sweden. In *J Appl Res Intellect Disabil* 28 (4), pp. 296–306. DOI: 10.1111/jar.12139.
- Yilmaz, Medine; Sari, Hatice Yildirim; Serin, G. Elif Ç.; Kisa, Sezer Seçkin; Aydın, Özgür (2014): The Effectiveness of Nutrition and Activity Programmes for Young Adults with Intellectual Disabilities. In *INT J CARING SCI* 7 (2), pp. 449–459. Available online at <http://search.ebscohost.com/login.aspx?direct=true&db=cin20&AN=103945289&site=ehost-live>.


10) References of text sources

Arksey, H., O'Malley, L. (2005). Scoping studies: towards a methodological framework. *International journal of social research methodology*, 8(1), 19-32. doi:10.1080/1364557032000119616

Bergström, H, Hagströmer, M, Hagberg, J, Elinder, L.S. (2013): A multicomponent universal intervention to improve diet and physical activity among adults with intellectual disabilities in community residences: a cluster randomised controlled trial. *Research in Developmental Disabilities*34(11), 3487–3857.

Bruland, D., Voss, M., Schülenkorf, T., Latteck, Ä.-D. (2019): Mit Schwung und Energie durch den Tag. Partizipative Forschung zur Förderung der bewegungsbezogenen Gesundheitskompetenz bei Menschen mit Lernschwierigkeiten. In: *Prävention und Gesundheitsförderung* 14(4), S. 368 - 374. doi:10.1007/s11553-019-00714-

Emerson E, Hatton C. (2014): *Health inequalities and people with intellectual disabilities*. New York: Cambridge University Press.

Guthold, R., Stevens, G.A., Riley, L.M., Bull, F.C. (2018): Worldwide trends in insufficient physical activity from 2001 to 2016: a pooled analysis of 358 population-based surveys with 1.9 million participants. *The Lancet Global Health* 6(10), e1077-e1086. [https://doi.org/10.1016/S2214-109X\(18\)30357-7](https://doi.org/10.1016/S2214-109X(18)30357-7) 

Hasseler Martina (2014). Menschen mit geistigen und mehrfachen Behinderungen als vulnerable Bevölkerungsgruppe in gesundheitlicher Versorgung. *Deutsche medizinische Wochenschrift*, 139: 2030-2034.

Levac, D., Colquhoun, H., & O'Brien, K. K. (2010). Scoping studies: advancing the methodology. *Implementation Science*, 5(69). doi:10.1186/1748-5908-5-69

MacRae, S., Brown, M., Karatzias, T., Taggart, L., Truesdale-Kennedy, M., Walley, R., Sierka, A., Northway, R., Carey, M., Davies, M. (2015): Diabetes in people with intellectual disabilities: A systematic review of the literature. *Research in Developmental Disabilities* 47, 352-374. <https://doi.org/10.1016/j.ridd.2015.10.003>

Mair, H., Offergeld, J. (2014): *Ältere Menschen mit Behinderung*. Baden-Württemberg Stiftung GmbH.

Munn, Z., Peters, M.D.J., Stern, C., Tufanaru, C., McArthur, A., Aromataris, E. (2018): Systematic review or scoping review? Guidance for authors when choosing between a

systematic or scoping review approach. *BMC Medical Research Methodology* 18, 143
<https://doi.org/10.1186/s12874-018-0611-x>

O'Leary, L., Cooper, S.A., Hughes-McCormack, L. (2018): Early death and causes of death of people with intellectual disabilities: A systematic review. *Journal of Applied Research in Intellectual Disabilities* 31(3), 325 – 342. <https://doi.org/10.1111/jar.12417>

Patja, K., Mölsä, P., Iivanainen, M. (2008): Cause-specific mortality of people with intellectual disability in a population-based, 35-year follow-up study. *Journal of Intellectual Disability Research* 45(1), 30 – 40. <https://doi.org/10.1111/j.1365-2788.2001.00290.x>

Sudeck, G., Pfeifer, K. (2016): Physical activity-related health competence as an integrative objective in exercise therapy and health sports – conception and validation of a short questionnaire. *Sportwissenschaften* 46, 74 – 87.

van Schijndel-Speet, M., Evenhuis, H.M., van Wijck, R., van Montfort, K.C., Echteld, M.A. (2017): A structured physical activity and fitness programme for older adults with intellectual disabilities: results of a cluster-randomised clinical trial. *Journal of Intellectual Disability Research* 61(1), 16 – 29.

WHO (World Health Organization) (2009). *Global health risks: mortality and burden of disease attributable to selected major risks*. World Health Organization. ISBN 978 92 4 156387 1

WHO (World Health Organization) (no year mentioned): *Global Strategy on Diet, Physical Activity and Health, Physical Activity*. <https://www.who.int/dietphysicalactivity/pa/en/>, accessed 25th November 2019.

WHO (World Health Organization) (no year mentioned): *Global Strategy on Diet, Physical Activity and Health, Physical Activity and Adults*. <https://www.who.int/dietphysicalactivity/pa/en/>, accessed 25th November 2019.