



**Developing Evidence-Informed Recommendations in
Rehabilitation for Older Adults Living with HIV: A
Knowledge Synthesis**

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68 **ABSTRACT**

69 **Objective:** Our aim was to develop evidence-informed recommendations in rehabilitation for
70 older adults living with HIV.

71 **Design:** We conducted a knowledge synthesis, combining research evidence specific to HIV,
72 rehabilitation and aging, with evidence on rehabilitation interventions for common
73 comorbidities experienced by older adults with HIV.

74 **Methods** We included highly relevant HIV-specific research addressing rehabilitation and aging
75 (stream A) and high-quality evidence on the effectiveness of rehabilitation interventions for
76 common comorbidities experienced by older adults aging with HIV (stream B). We extracted
77 and synthesized relevant data from the evidence to draft evidence-informed recommendations
78 on rehabilitation. Draft recommendations were refined based on people living with HIV (PLHIV)
79 and clinician experience, values and preferences, reviewed by an interprofessional team for
80 GRADE (quality) rating and revision, and then circulated to PLHIV and clinicians for external
81 endorsement and final refinement. We then devised overarching recommendations to broadly
82 guide rehabilitation for older PLHIV.

83 **Results:** This synthesis yielded eight overarching and 52 specific recommendations. Thirty-six
84 specific recommendations were derived from 108 moderate or high level research articles
85 (meta-analyses and systematic reviews) that described the effectiveness of rehabilitation
86 interventions for comorbidities that may be experienced by older adults with HIV.
87 Recommendations addressed rehabilitation interventions across eight health conditions: bone
88 and joint disorders, cancer, stroke, cardiovascular disease, mental health challenges, cognitive
89 impairments, chronic obstructive pulmonary disease, and diabetes. Sixteen specific

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3 90 recommendations were derived from 42 research articles specific to rehabilitation for older
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6 91 adults with HIV. The quality of evidence from which these recommendations were derived was
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9 92 either low or very low, consisting primarily of narrative reviews or descriptive studies with small
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11 93 sample sizes. Recommendations addressed approaches to rehabilitation assessment and
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13 94 interventions, and contextual factors to consider with rehabilitation of older adults living with
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16 95 HIV.

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18 96 **Conclusions:** These evidence-informed recommendations provide a guide for rehabilitation
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21 97 with older adults with HIV.
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3 98 **Strengths and Limitations of this Study**
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7 99 ■ We developed evidence-informed recommendations for rehabilitation with older adults
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9 100 living with HIV using a complex knowledge synthesis of two distinct areas of literature
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11 101 while incorporating people living with HIV and clinician preferences throughout.
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14 102 ■ Fifty-two recommendations were developed.
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17 103 ○ Thirty-six specific recommendations were derived from 108 moderate or high level
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19 104 research articles that described the effectiveness of rehabilitation interventions for
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21 105 comorbidities that may be experienced by older adults with HIV. Recommendations
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23 106 addressed rehabilitation interventions across eight health conditions commonly
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25 107 experienced by older adults living with HIV.
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29 108 ○ Sixteen specific recommendations were derived from 42 research articles specific to
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31 109 rehabilitation for older adults with HIV.
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34 110 ■ To our knowledge, these are the first evidence-informed recommendations for rehabilitation
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36 111 developed specifically for older adults with HIV.
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39 112 ■ Recommendations address approaches to rehabilitation assessment and interventions, and
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41 113 contextual factors to consider with rehabilitation of older adults living with HIV.
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117 INTRODUCTION

118 As adults age with HIV, more individuals are living with the physical, social and psychological
119 consequences of the disease, long term treatment, and comorbidities associated with aging [1-
120 4]. For many, HIV is experienced as a chronic illness whereby individuals experience a range of
121 health-related challenges known as **disability**, including symptoms and impairments (e.g.
122 fatigue, weakness, pain), difficulties with day-to-day activities (e.g. household chores),
123 challenges to social inclusion (e.g. ability to work) and uncertainty or worrying about future
124 health as they age [5-7]. Premature onset of cardiovascular disease [8], diabetes [8], bone and
125 joint disorders [9], neurocognitive disorders [10] and non-AIDS-defining cancers [11] further
126 add to the complexity of disability aging with HIV [12-16]. Rehabilitation has become an
127 increasingly important strategy to address disability experienced by adults aging with HIV and
128 specifically older adults living with comorbidities [17].

129 **Rehabilitation** is broadly defined as any service or health provider that may address or
130 prevent impairments, activity limitations or social participation restrictions experienced by an
131 individual [17]. Rehabilitation assists in managing the health-related challenges or disability
132 associated with HIV such as adverse effects of medications, fatigue, pain, neuropathy, mental
133 health problems, cognitive problems and issues related to income and vocational support.
134 Rehabilitation approaches such as physical therapy and occupational therapy are well
135 established in complex chronic disease management and are associated with improvements in
136 health outcomes in cardiovascular disease [18], stroke [19], and cancer [20]. However,
137 rehabilitation in the context of HIV is still emerging. Few rehabilitation professionals work with
138 people living with HIV (PLHIV) highlighting a gap in service provision and need for further HIV

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3 139 knowledge, training and clinical guidance [21]. Evidence-informed guidelines are essential to
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6 140 enhance awareness among clinicians, researchers, educators, and PLHIV and to optimize HIV
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9 141 rehabilitation for older adults with HIV.

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12 142 No known guidelines specific to HIV rehabilitation and aging exist. Developing evidence-
13
14 143 informed recommendations in an emerging area of practice is challenging when high levels of
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17 144 evidence in the form of systematic reviews and meta-analyses are often not available. Such is
18
19 145 the case with HIV, which has transitioned from an acute fatal illness to a chronic condition since
20
21 146 the advent of combination antiretroviral therapies in the mid-1990s. Combining lower level
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23 147 evidence on emerging issues of HIV and aging with higher level evidence on rehabilitation
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26 148 interventions for other health conditions experienced by older adults with HIV can provide a
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28 149 strong foundation for the development of evidence-informed recommendations. Our aim was
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31 150 to develop evidence-informed recommendations in rehabilitation for older adults living with
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34 151 HIV.

37 152 **METHODS**

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40 153 We conducted a knowledge synthesis combining two streams of evidence: A) highly relevant
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42 154 HIV-specific evidence addressing rehabilitation and aging and B) high quality evidence on the
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44 155 effectiveness of non-pharmacologic rehabilitation interventions for comorbidities commonly
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47 156 experienced by older adults aging with HIV. Synthesizing this evidence allowed us to consider
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49 157 emerging literature specific to HIV and aging while taking advantage of existing high level
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52 158 evidence on interventions for common conditions experienced by older adults and customizing
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55 159 it to older adults with HIV.

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3 160 This research was led by an interdisciplinary team of researchers, educators, health
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6 161 providers with expertise in HIV, aging, and rehabilitation and PLHIV with lived experience of
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9 162 aging with HIV. The team engaged in all aspects of this study including the identification,
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11 163 appraisal and synthesis of the literature, and development and refinement of the evidence-
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13 164 informed recommendations. We incorporated PLHIV values and preferences and clinical
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16 165 expertise throughout [22]. This research received Research Ethics Board approval from
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18 166 McMaster University, Hamilton, Ontario, Canada.
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21 22 167 **Searching and Identifying the Literature and Data Extraction**

23 24 25 168 *Stream A) Evidence specific to HIV, aging and rehabilitation*

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28 169 We conducted a synthesis of published literature specific to HIV, aging and rehabilitation. We
29
30 170 searched electronic databases including MEDLINE, CINAHL, EMBASE, PsycINFO, from 1980 to
31
32 171 December 2010. Search terms included: HIV, aging, and rehabilitation and were altered
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34
35 172 depending on the database. We included studies that addressed issues related to HIV, aging
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37 173 (older adults 50 years and older) and rehabilitation, and were published in the English language.
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39 174 We defined 'rehabilitation' as any non-pharmacological services, interventions, or providers
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41 175 who address or prevent impairments, activity limitations and social participation restrictions
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43 176 experienced by an individual [17]. Given this is an emerging area of literature; all study designs,
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46 177 including narrative reviews were included.
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51 178 *Stream B) High level evidence on rehabilitation interventions specific to comorbidities that may*
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54 179 *be experienced by older adults living with HIV*
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3 180 We searched for high-quality evidence (systematic reviews and meta-analyses) on the
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6 181 effectiveness of non-pharmacologic rehabilitation interventions for comorbidities that may be
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9 182 experienced by older adults aging with HIV. We searched electronic databases including
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11 183 MEDLINE, CINAHL, EMBASE, PsycINFO, the Cochrane Database of Systematic Reviews, and the
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13 184 National Guideline Clearinghouse from 1980 to August 2011 for systematic reviews and meta-
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16 185 analyses related to common comorbidities. We included systematic reviews or meta-analyses
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18 186 that addressed one or more comorbidities experienced by adults living with HIV which included
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21 187 but were not limited to: bone and joint disorders, cancer, cardiovascular disease, mental
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23 188 health, neurocognitive decline, cardiopulmonary disease, diabetes and were published in
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26 189 English.

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29 190 Five individuals independently reviewed abstracts from Stream A and B evidence to
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32 191 determine their eligibility for inclusion. Where disagreements occurred, the full text was
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34 192 retrieved and a third reviewer determined final inclusion [23]. Two individuals independently
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37 193 reviewed full articles for inclusion. In situations of disagreement reviewers discussed articles to
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39 194 reach consensus on final inclusion. Five individuals independently extracted data from the final
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42 195 group of included evidence onto a data charting form. Data extracted from Stream A evidence
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44 196 included author, year, study location, study purpose, study design, intervention type and
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47 197 comparison group if any, details of the intervention, study populations, sample size, outcome
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49 198 measures, key results, authors' overall conclusions, and reviewers' interpretations of important
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52 199 considerations and recommendations for HIV rehabilitation and aging. Data extracted from
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55 200 Stream B evidence included author, year, study purpose, study design (systematic review or
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57 201 meta-analysis), characteristics of participants, number of included studies, sample size,
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3 202 intervention(s) and comparison group (if any), frequency, intensity, time and type of each
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6 203 intervention, outcome measures, key results, overall author conclusions, and reviewers'
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9 204 interpretations of considerations for developing evidence-based recommendations for older
10
11 205 adults living with HIV.

14 206 **Development of the Recommendations**

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17 207 We developed the evidence-informed recommendations using a three-phase iterative process
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19 208 involving 1) classification, grading methodological quality, synthesis of the evidence, and
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21 209 drafting the preliminary recommendations, 2) interprofessional team review, grading and
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23 210 revision of recommendations incorporating values and preferences, and 3) external
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25 211 endorsement and final refinement.
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30 212 **PHASE 1 - Classification, Grading Methodological Quality, Synthesis and Drafting the**

32 213 **Preliminary Recommendations (Figure 1)**

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35 214 Our search yielded a total of 6664 independent citations (2512 from stream A and 4152 from
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37 215 stream B), of which 165 studies (50 studies from Stream A, and 115 studies for Stream B) met
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39 216 our inclusion criteria. Overall, our Phase 1 synthesis yielded 25 recommendations from Stream
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41 217 A evidence, and 49 recommendations from Stream B evidence for a total of 74 preliminary
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43 218 recommendations.
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48 219 *Stream A - Evidence specific to HIV, rehabilitation and aging*

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51 220 We classified the evidence (n=50 studies) based on 11 concepts to draft the preliminary
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53 221 recommendations ranging from overarching principles for rehabilitation with older adults living
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55 222 with HIV to interventions (Figure 1). We then assessed the methodological quality of each
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3 223 included article and the quality of the collective group of evidence from each of the 11 key
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6 224 concepts used to draft each recommendation using GRADE methodological quality criteria [24-
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8 225 28]. Two authors knowledgeable in HIV, aging and rehabilitation (AMT, KO) independently
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11 226 synthesized the extracted data using directed content analysis techniques [29] and formulated
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13 227 key themes surrounding rehabilitation assessment and treatment that informed the
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16 228 recommendations. One author (KO) then drafted 25 preliminary recommendations by
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18 229 synthesizing results and conclusions from each collective group of evidence. Subsequently, two
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21 230 authors (PS, KO) met to review the accuracy of the content analysis and collectively agreed on
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23 231 preliminary evidence-informed recommendations specific to HIV, aging and rehabilitation.

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27 232 *Stream B - High level evidence on rehabilitation interventions for common comorbidities*

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29 233 We grouped Stream B evidence by comorbidity experienced by older adults living with HIV,
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32 234 followed by the respective intervention. We classified the evidence based on 11 areas (bone
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34 235 and joint disorders; cancer; stroke; cardiovascular disease (CVD); mental health challenges;
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36 236 cognitive impairments; Parkinson's Disease; chronic obstructive pulmonary disease (COPD);
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39 237 diabetes; older adults; HIV) (Figure 1). We assessed the methodological quality of each article,
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42 238 and the quality of evidence from each collective area of focus used to draft each
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44 239 recommendation using the GRADE criteria [24-28]. Two authors (KO, AMT) independently
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46 240 synthesized the recommendations from the meta-analyses and systematic reviews using
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49 241 directed content analysis techniques [29] surrounding assessment, treatment intervention,
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52 242 intensity, progression of intensity, and health outcomes for each comorbidity. One author (KO)
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54 243 then drafted a total of 49 preliminary recommendations from the 115 included articles by
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57 244 synthesizing each collective group of study results and overall conclusions. Two authors (KO, PS)
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3 245 met to review the accuracy of the synthesis to collectively determine preliminary evidence-
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6 246 informed recommendations for each of the comorbidities. The resulting 49 recommendations
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9 247 for Stream B spanned 11 areas of focus: bone and joint disorders (6 recommendations); cancer
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11 248 (8); stroke (12); CVD (7); mental health challenges (4); cognitive impairments (3); Parkinson's
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13 249 disease (1); COPD (4); diabetes (1); older adults (2); and HIV (1).
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17 250 **PHASE 2 – Research Team GRADING of Recommendations and Incorporating Values and**
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19 251 **Preferences among PLHIV and Clinicians (Figure 2)**
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23 252 We circulated the 74 preliminary recommendations to researchers, PLHIV and clinicians on the
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25 253 synthesis team in order to obtain GRADE ratings for the recommendations and incorporate
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28 254 individual experiences, values and preferences. For each recommendation, the team member
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30 255 indicated the GRADE rating incorporating both quality of the evidence and the extent to which
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32 256 the recommendation was applicable to older adults living with HIV. GRADE rating at this stage
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35 257 included four levels [24-28]: **High** – fully endorse or strongly recommended. This
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37 258 recommendation would be appropriate for the majority of older adults living with HIV,
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39 259 suggested wording of the recommendation would include; 'we should or should not do';
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42 260 **Moderate** – moderately endorse or recommend. This recommendation would be applicable to
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45 261 some older adults with HIV; **Low** - minimally endorse or weak recommendation. This
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48 262 recommendation would be applicable to a few older adults with HIV, with potential variability
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50 263 in values and preferences. Wording of this recommendation would include; 'we suggest, may
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52 264 recommend or may not recommend'; or **Very low** - do not endorse or do not recommend at all.
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55 265 This recommendation would not be appropriate for older adults living with HIV.
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3 266 This phase of GRADE rating required a trade-off between benefits and drawbacks, and
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6 267 values and principles of the PLHIV, clinician or researcher. Team members were asked to
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9 268 comment on their values and preferences related to the recommendation and how these
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11 269 influenced their rating. Team members also suggested revisions or refinement to the
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14 270 recommendation.

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17 271 Collectively the evidence specific to HIV aging and rehabilitation (Stream A) was low to
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19 272 very low quality as much of the evidence consisted of cross-sectional qualitative or quantitative
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22 273 studies (with no comparison group) or narrative reviews. No RCTs were included. Clinicians and
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24 274 PLHIV on the team incorporated their clinical expertise and experience, values and preferences,
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26
27 275 respectively, when determining their final GRADE rating. For Stream B given only systematic
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29 276 reviews or meta-analyses were included, the rating of the evidence was either very high or
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32 277 high. However, the GRADING of the recommendation depended on the extent to which the
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34 278 team felt the evidence was applicable to older adults with HIV and if the intervention posed
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37 279 minimal risk or harm to those living with HIV and these comorbidities.
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3 280 **Phase 2 GRADE Results**
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7 281 The research team met twice to discuss the overall GRADE results, and recommendations for
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9 282 revision (Research Team Meetings #2 and #3). In the latter meeting we summarized and
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11 283 incorporated values and preferences of PLHIV and clinicians into the recommendations (Figure
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18 285 *Stream A - GRADE RATING RESULTS and REVISION*
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21 286 We consolidated similar or overlapping recommendations and deleted those not highly
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23 287 endorsed by the majority of the team. We also removed recommendations to specific
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25 288 interventions with inconclusive evidence because of team concerns of endorsing specific
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27 289 interventions over others under-reported in the research evidence.
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32 290 Overall this process resulted in the deletion of eight articles. The remaining 42 articles
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34 291 in Stream A yielded 16 evidence-informed recommendations for older adults with HIV that
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36 292 spanned three themes: 1) implications for future education of rehabilitation professionals (1
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38 293 recommendation); 2) approaches to rehabilitation assessment and treatment (14
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40 294 recommendations); and 3) interventions (1 recommendation) (Figure 2).
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45 295 *Stream B - GRADE RATING RESULTS and REVISION*
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49 296 Based on the GRADE rating of team members and our meeting discussions we revised the
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51 297 Stream B recommendations. We deleted recommendations that were not endorsed by the
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53 298 clinicians and PLHIV and recommendations that referred to conditions not common to HIV and
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55 299 aging. Overall this process resulted in the removal of 6 articles. The remaining 109 articles in
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3 300 Stream B yielded 40 evidence-informed recommendations that spanned the 10 areas: bone and
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6 301 joint disorders, cancer (general, lung and metastatic cancer), stroke, CVD (myocardial infarction,
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9 302 heart disease, heart failure), mental health challenges, cognitive impairment, COPD, diabetes,
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11 303 older adults and HIV/AIDS (Figure 2). Recommendations spanned interventions including
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13 304 exercise, rehabilitation, self-management, cognitive rehabilitation, pulmonary rehabilitation,
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16 305 electrotherapeutic modalities, cardiac rehabilitation, inspiratory muscle training,
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18 306 psychotherapy, models of care, and housing models.
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22 307 **PHASE 3 - EXTERNAL ENDORSEMENT- Incorporating 'expert knowledge' from clinicians and**
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24 308 **adults living with HIV (Figure 3)**
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28 309 We circulated the recommendations electronically to a broader group of 38 clinicians and PLHIV
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30 310 for external endorsement using an online survey. We asked participants whether they
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32 311 endorsed, did not endorse, or had no opinion about each recommendation. Participants were
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34 312 also invited to provide comments. We considered endorsement rates of >80%, 60-80%, and
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36 313 <60% as high, moderate and low levels of endorsement, respectively. Responses from this
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38 314 endorsement phase were incorporated into the final revision and refinement of the evidence-
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40 315 informed recommendations (Figure 3).
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46 316 **External Endorsement Results:** Of the 38 PLHIV and clinicians invited to participate in the online
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48 317 endorsement survey, 19 (50%) completed the online survey. Of the 19 individuals who
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50 318 completed the endorsement survey, 9 (47%) were health professionals, 8 (42%) were PLHIV and
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52 319 2 (11%) were both a health professional and PLHIV. Health professionals included physicians
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3 320 (geriatrics and infectious diseases) (27%), occupational therapists (27%), speech-language
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6 321 pathologists (27%) and social workers (18%).
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8 322 Rates of endorsement for each recommendation ranged from 47% (9/19 participants) to
9
10 323 100% (19/19 participants). The number of participants who viewed the citations from which
11
12 324 the recommendations were derived ranged from three (16%) to 10 participants (53%).
13
14 325 Participants tended to highly endorse recommendations in Stream A and those in Stream B
15
16 326 related to exercise. Recommendations related to inconclusive evidence had lower rates of
17
18 327 endorsement. Endorsement participants highlighted how recommendations could be
19
20 328 applicable to any population (not just older adults with HIV). Others recommended highlighting
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22 329 other interventions not captured in the recommendations, such as yoga or tai-chi. See Data
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24 330 Supplement File 1 for an overview of the endorsement results.
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31 331 Two recommendations endorsed by <60% of participants were removed. The team
32
33 332 further synthesized the final 52 specific recommendations into eight overarching
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35 333 recommendations on rehabilitation for older adults living with HIV. See Data Supplement File
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37 334 2 for the Final Evidence-Informed Recommendations and Data Supplement File 3 for
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39 335 characteristics of included studies in the final recommendations.
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43 336 **Final Recommendations**

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46 337 Results of this synthesis are presented across two streams that represent the two different
47
48 338 bodies of research evidence totaling 52 specific recommendations (Data Supplement File 2).
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50 339 We also present overarching recommendations derived from the specific detailed evidence-
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52 340 informed recommendations on rehabilitation for older adults living with HIV (Table 1).
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3 341 *Specific (Detailed) Recommendations*
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6 342 Stream A results include 16 recommendations derived from 42 research evidence articles
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8 343 specific to rehabilitation for older adults living with HIV. The level of evidence from which these
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10 344 recommendations were derived was either low or very low, meaning the articles were mostly
11
12 345 narrative review articles or descriptive studies (either qualitative or quantitative) with small
13
14 346 sample sizes. Although the studies were low level evidence, the PLHIV and clinician
15
16 347 endorsements indicated that these were of fundamental importance in management of
17
18 348 disability in older adults living with HIV. Stream A recommendations serve as the contextual
19
20 349 backdrop to providing rehabilitation care, treatment and support to older adults living with HIV.
21
22 350 Some of the recommendations have additional explanatory notes to further explain the context
23
24 351 and PLHIV and clinician values (Data Supplement File 2). The recommendations are organized
25
26 352 into six categories: A) preparedness of rehabilitation professionals; B) approaches to
27
28 353 rehabilitation assessment and treatment of older adults living with HIV; C) extrinsic factors to
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30 354 consider with rehabilitation of older adults living with HIV; D) intrinsic factors to consider with
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32 355 rehabilitation of older adults living with HIV; E) rehabilitation approaches; and F) rehabilitation
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34 356 interventions (Data Supplement File 2).
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44 357 Stream B results include 36 recommendations derived from 108 moderate or high level
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46 358 research evidence articles describing the effectiveness of rehabilitation interventions for adults
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48 359 living with health conditions and include specific considerations when applying rehabilitation
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50 360 interventions for older PLHIV (Figure 3). Stream B recommendations include an overview of
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52 361 the prevalence of the condition among older adults with HIV, main health-related challenges
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54 362 for older adults with HIV experiencing this condition from a rehabilitation perspective, study
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3 363 citations and level of evidence from which the recommendation was derived, age of
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6 364 participants included in the evidence (not all high level rehabilitation intervention evidence was
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8
9 365 specific to older adults). The recommendations include specific considerations for older adults
10
11 366 with HIV. The recommendations are presented based on interventions across A) older adults, B)
12
13 367 HIV/AIDS, and eight common comorbidities that may be experienced by older adults with HIV;
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16 368 C) bone and joint disorders, D) cancer, E) stroke, F) cardiovascular disease, G) mental health
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18 369 challenges, H) cognitive impairments, I) COPD and J) diabetes (Data Supplement File 2).
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21 370 *Overarching Recommendations*

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25 371 To facilitate knowledge transfer and exchange, we established overarching recommendations
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27
28 372 that summarized the detailed recommendations in a condensed manner (Table 1). We
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30 373 consolidated the 52 specific recommendations into eight overarching recommendations on
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32 374 rehabilitation for older adults living with HIV. These recommendations were endorsed at a final
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34
35 375 team meeting and provide a broader overview of the evidence synthesis.
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38 376 **Table 1- Overarching Evidence-Informed Recommendations in Rehabilitation for Older Adults**

39 40 41 377 **Living with HIV**

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43 378 The following overarching recommendations provide a general guide to providing rehabilitation care,
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46 379 treatment and support with older adults living with HIV.
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Overarching Recommendations in Rehabilitation for Older Adults Living with HIV

1. Rehabilitation professionals should be prepared to provide care to older adults with HIV who present with **complex comorbidities** affecting neurological, cardiorespiratory and musculoskeletal systems that may result in physical, mental and social health challenges.
2. Rehabilitation professionals should adopt an **individualized and interprofessional approach to practice** that is sensitive to the **unique values, preferences and needs of older adults with HIV**. This approach should include comprehensive assessment and treatment of **physical, neurocognitive and mental health impairments, uncertainty (or worrying about the future), functional activity limitations, and social exclusion** while considering the intersections between **personal and social attributes** and the **broader determinants of health**.
3. **Multidisciplinary rehabilitation** including physical therapy, occupational therapy and speech-language pathology is strongly recommended across the **continuum of care** (acute, rehabilitation and community-based care) for older adults with HIV to address the multi-dimensional and episodic nature of disability attributed to HIV and its comorbidities such as bone and joint disorders, cancer, stroke, cardiovascular disease, mental health, cognitive impairment, chronic obstructive pulmonary disease (COPD) and diabetes.
4. Rehabilitation professionals should consider the role of **extrinsic contextual factors** such as stigma and ageism, HIV disclosure, and emotional and practical social supports on the health and well-being of older adults living with HIV.
5. Rehabilitation professionals should consider the role of **intrinsic contextual factors** such as self-management and spirituality on the health and well-being of older adults living with HIV.
6. A **combination of aerobic and resistive exercise** may be recommended for older adults living with HIV who are medically stable and living with comorbidities including bone and joint disorders, cancer, stroke, cardiovascular disease, stroke, mental health, cognitive impairment, chronic obstructive pulmonary disease (COPD), and diabetes. The frequency, intensity, time and type of exercise should be individually tailored to the specific goals and capacity of the individual and the specific co-morbidity.
7. **Cognitive rehabilitation interventions** (e.g. cognitive training, cognitive stimulation, cognitive rehabilitation) may be recommended for older adults living with HIV with mild cognitive impairment, and stroke. Inconclusive or insufficient evidence exists to support the use of **cognitive behavioural therapy** with older adults with HIV with **depression**. While cognitive rehabilitation does not appear harmful, weak evidence exists to support the use of cognitive-specific interventions to improve spatial neglect, disability, memory, and functional status for older adults who experience stroke. Rehabilitation professionals are encouraged to refer to specific clinical practice guidelines for each health condition to determine the effects of different cognitive interventions for older adults with HIV living with comorbidity.

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8. In the absence of high level evidence on rehabilitation interventions for older adults living with HIV and comorbidities, rehabilitation professionals should refer to **existing clinical practice guidelines, systematic reviews, meta-analyses, and other forms of high level evidence for recommendations on interventions for a specific comorbidity**. These recommendations should be applied using an individualized approach incorporating the unique values, preferences, goals and needs of the individual.

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382 **DISCUSSION**

383 We developed evidence-informed recommendations for rehabilitation with older adults living
384 with HIV using a complex knowledge synthesis of two distinct areas of literature while
385 incorporating PLHIV and clinician preferences throughout. To our knowledge, these are the first
386 evidence-informed recommendations for rehabilitation developed specifically for older adults
387 with HIV.

388 These recommendations may be useful for rehabilitation clinicians who have not
389 worked with PLHIV and HIV specialists unfamiliar with rehabilitation who need an
390 understanding of evidence-informed rehabilitation so that they can make appropriate referrals
391 for their older clients living with HIV. Stream A recommendations were derived from very low
392 level evidence and result in general statements. Nevertheless, we feel these recommendations
393 are useful in addressing an overall approach to working with older adults with HIV. The low
394 level of evidence derived from this area of literature highlights the paucity of evidence specific
395 to rehabilitation for older adults with HIV and indicates the need for increased work in this
396 area. While our focus was with older adults with HIV, many of the Stream B recommendations
397 were derived from evidence not specific to older adults. The wording of our recommendations
398 depended on how well, or to what extent we could make the 'leap' from the condition-specific

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3 399 evidence to a recommendation for rehabilitation specific to older adults living with HIV with
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6 400 these comorbidities. We included an overview of the prevalence of the comorbidities among
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9 401 older adults with HIV to assist clinicians in implementing the recommendations among adults
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11 402 with HIV living with comorbidities [33]. The supportive notes that augment the
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13 403 recommendations were derived primarily from PLHIV and clinician values and preferences to
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16 404 help to situate the recommendation into the context of older adults with HIV. Rehabilitation
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18 405 professionals often tailor treatment strategies to address the consequences of disease
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21 406 (disability) framed with goal setting, and an individualized approach considering the unique
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23 407 health and social challenges experienced by older adults with HIV. In the absence of high level
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26 408 evidence on rehabilitation interventions specific to older adults with HIV, clinicians may refer to
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28 409 the existing guidelines for the specific comorbidity, and incorporate an individualized approach
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31 410 to assessment and treatment.
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34 411 We chose to present a combination of specific and overarching recommendations to
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36 412 guide rehabilitation for older adults with HIV. Those working with older adults with a specific
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38 413 comorbidity may find the detailed recommendations useful to their practice. Although specific
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40 414 recommendations are more likely to be followed [30], we feel the consolidated (overarching)
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42 415 recommendations may be useful to health providers less familiar working in HIV care and well-
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44 416 suited for knowledge translation to a broader health provider audience and community-based
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53 418 Overall strengths of our approach included our unique synthesis of two distinct areas of
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55 419 literature combining lower level evidence on emerging issues of HIV and aging with higher level
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3 420 evidence on comorbidities commonly experienced by PLHIV to provide a strong foundation for
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6 421 the development of evidence-informed recommendations. We used a systematic approach to
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8 422 identifying literature, determining inclusion, data extraction, and drafting and refining the
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10 423 recommendations. We drafted the recommendations to include clear actionable and precise
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12 424 terminology, associated with the level of evidence available. We included specific citations
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14 425 from which the recommendation was derived so readers may refer to the original evidence
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16 426 source of the recommendation [32]. Our interprofessional and community-integrated
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18 427 approach involving 'expert' older PLHIV and clinicians brought a diverse group of stakeholders
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20 428 together on numerous occasions to engage in the iterative process of recommendation
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22 429 development, review and refinement and ensured the recommendations were practical and
23
24 430 relevant to the HIV community. External endorsement further integrated PLHIV and clinician
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26 431 preferences into assessing the feasibility and refinement of recommendations for use in HIV
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28 432 practice [33]. Knowledge, values and experiences of clinicians and PLHIV were integral into the
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30 433 development of the recommendations, particularly when determining the relevance or unique
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32 434 considerations when devising recommendations from evidence derived from other chronic
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34 435 conditions.
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44 436 Challenges of this synthesis included combining two areas of research evidence that
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46 437 differed in quality and context. We chose to retain two parallel but distinct syntheses
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48 438 presented as one collective set of recommendations enabling us to synthesize emerging lower
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50 439 level evidence on HIV aging and rehabilitation with higher level more established evidence in
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52 440 chronic diseases experienced by older adults with HIV [34]. Much of the evidence from which
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54 441 these recommendations were derived is from the United States, hence the generalizability of
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3 442 these recommendations to other contexts is unknown. The lack of high level Stream A
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6 443 evidence specific to HIV, aging and rehabilitation resulted in high level considerations when
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8 444 working with older adults with HIV, and emphasize the need for further rehabilitation
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11 445 intervention research specific to older adults with HIV. Disparities emerged among evidence
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13 446 considered weak by GRADE definition, but essential to the values and preferences of PLHIV and
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16 447 clinicians. We were uncertain how to weight the research evidence with PLHIV and clinician
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18 448 values and preferences in order to establish the strength of a given recommendation. We chose
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21 449 to remove recommendations for rehabilitation approaches with weak evidence that were not
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23 450 highly endorsed by the majority of team members. Finally, these evidence-informed
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26 451 recommendations do not specifically address the issue of caregiving, respite and potential
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28 452 caregiver burnout, important issues that should be considered by clinicians in the context of
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31 453 HIV and aging [31].
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34 454 The development of these recommendations is timely given the changing demographic
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37 455 of adults aging with HIV. These recommendations directly address key research priorities on
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39 456 comorbidities and access to rehabilitation identified in a national scoping study of the Canadian
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42 457 Working Group on HIV and Rehabilitation (CWGHR) [35]. Our recommendations also address
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44 458 key issues related to HIV, rehabilitation and aging that emerged from a national consultation
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47 459 with PLHIV, researchers, educators, clinicians, and policy stakeholders by CWGHR including
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49 460 comorbidities experienced by older PLHIV and social determinants of health [36]. These issues
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52 461 similarly emerged from the external endorsement whereby participants also indicated the
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54 462 importance of end of life care [37], lifestyle modifications including adoption of exercise and
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57 463 yoga [38, 39], and smoking cessation among older adults with HIV [40] as critical to consider in
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3 464 the care and prevention strategies to enhance health for older PLHIV. We developed these
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6 465 recommendations in accordance with the principles outlined by CWGHR for the development of
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8 466 guidelines for rehabilitation in HIV.[41] Merging the traditionally separate areas of rehabilitation, HIV
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10 467 and disability, enabled us to create evidence-informed recommendations that are relevant for
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12 468 rehabilitation in the context of HIV and provide clear actionable recommendations that could direct
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14 469 future practice. [41]
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18 470 Limitations of this research included the qualitative nature of the synthesis whereby we
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20 471 were unable to pool results from included studies into meta-analyses. Given our approach to
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22 472 identify comorbidities, we may have missed other high level evidence on rehabilitation
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24 473 interventions such as fall prevention or balance training that may not be specific to our pre-
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26 474 determined comorbidities but may be employed with older adults living with multiple
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28 475 comorbidities. Rehabilitation interventions clinicians use in practice beneficial to older adults
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30 476 with HIV may not have been captured in this synthesis due to the paucity of HIV and aging
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32 477 literature (Stream A) or due to their lack of high level of evidence (Stream B). Ongoing revision
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34 478 of the recommendations will be required to reflect the emerging evidence and changing needs
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36 479 of older adults living with HIV.
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44 480 **CONCLUSIONS**

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46 481 We established eight overarching and 52 specific evidence-informed recommendations from a
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48 482 combination of low level evidence specific to HIV, aging and rehabilitation and high level
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50 483 research evidence describing the effectiveness of rehabilitation interventions for adults living
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52 484 with comorbidities experienced by older adults with HIV. PLHIV and clinician values and
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54 485 preferences were integral in developing these recommendations. Recommendations address
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3 486 approaches to rehabilitation assessment and interventions, and contextual factors to consider
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6 487 with rehabilitation of older adults living with HIV. These evidence-informed recommendations
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8 488 provide a guide for rehabilitation with older PLHIV.
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13 490 **AUTHORS' CONTRIBUTIONS**

16 491 KO and PS led the conceptual design of the study, acquisition of funding, conducted the
17
18 492 synthesis, and drafted the manuscript. KO, PS, AMT, DM, and BT reviewed evidence for
19
20
21 493 inclusion; KO, PS, BT, AMT, and DM extracted data from included studies; KO, AMT, PS, and BT,
22
23 494 conducted the initial methodological quality assessment and primary synthesis; LB, BT, DM, AC,
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25
26 495 WC, GR, JW, and TT were involved in the review and GRADING of the recommendations,
27
28 496 analytical interpretations, endorsement, and refinement of the recommendations. JM provided
29
30
31 497 overall guidance on the synthesis methodology. EZ was the principal knowledge user and
32
33 498 advised on the overall development and process for future translation of the
34
35
36 499 recommendations. All authors read and approved the final manuscript.
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53
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55
56 507 review, endorsement survey summary, and the formatting of the recommendations. We also
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26 517 Foundation).
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49
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529 **DATA SUPPLEMENT FILES (WEB ONLY)**

530 Data Supplement File 1 – External Endorsement Results

531 Data Supplement File 2 - Evidence Informed Recommendations in Rehabilitation for Older
Adults Living with HIV

533 Data Supplement File 3 - Characteristics of Included Studies in the Evidence-Informed
534 Recommendations in Rehabilitation for Older Adults Living with HIV

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Figure 1: Overview of Knowledge Synthesis Procedure – Classification, Assessing Methodological Quality, Synthesis and Drafting Preliminary Recommendations (Phase 1)

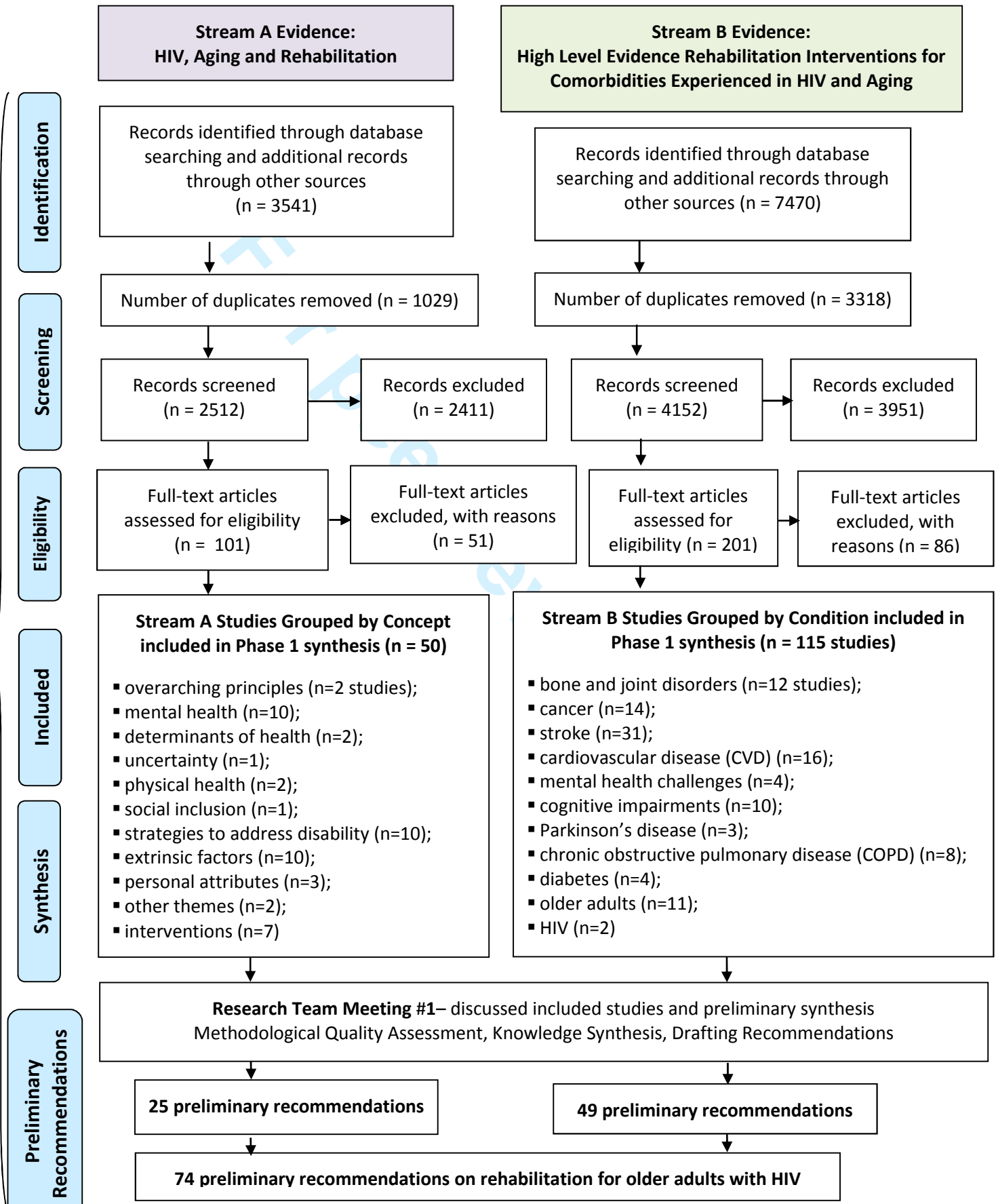


Figure 2: Overview of Knowledge Synthesis Procedure – Research Team GRADING of Recommendations and Incorporating Values and Preferences (Phase 2)

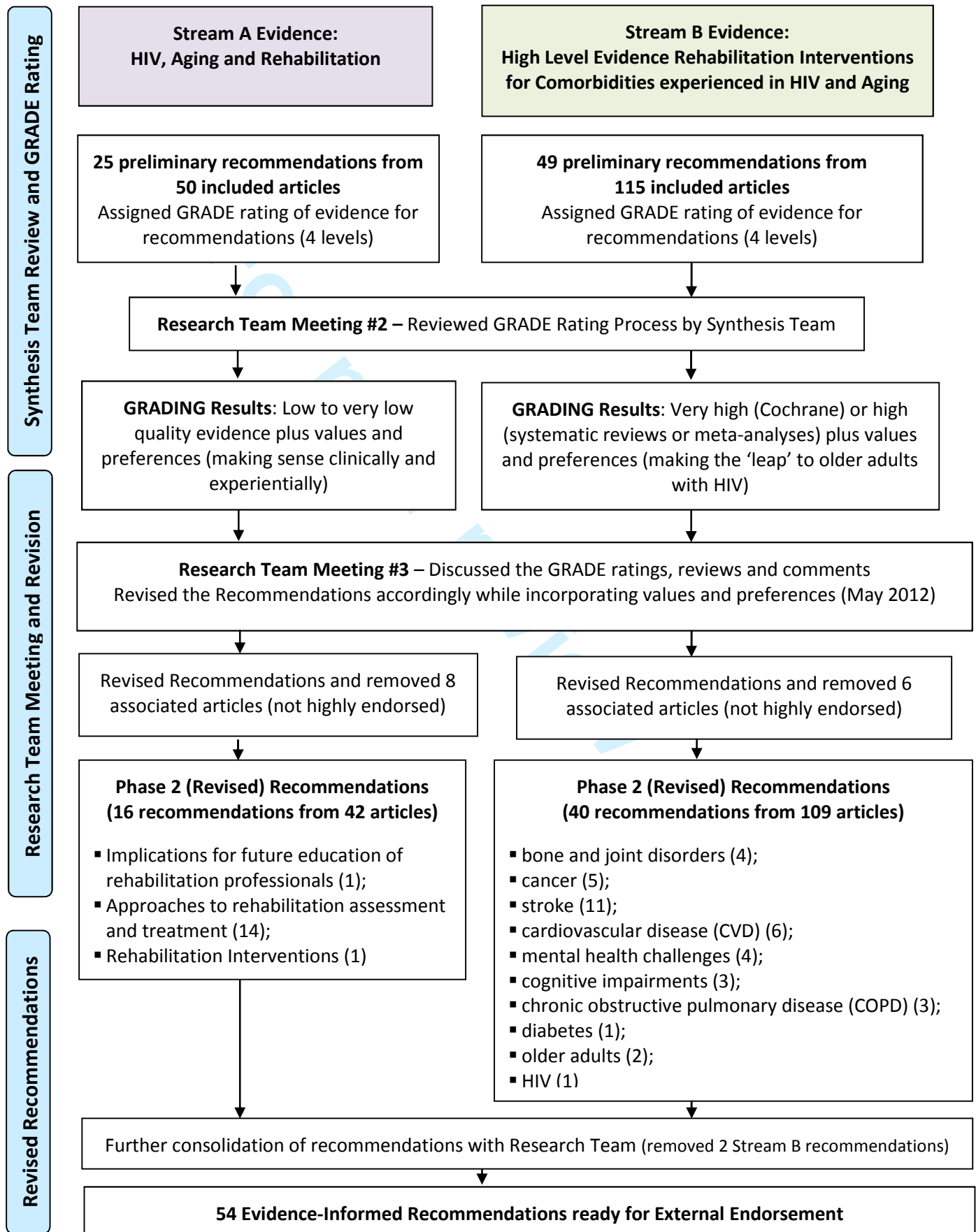
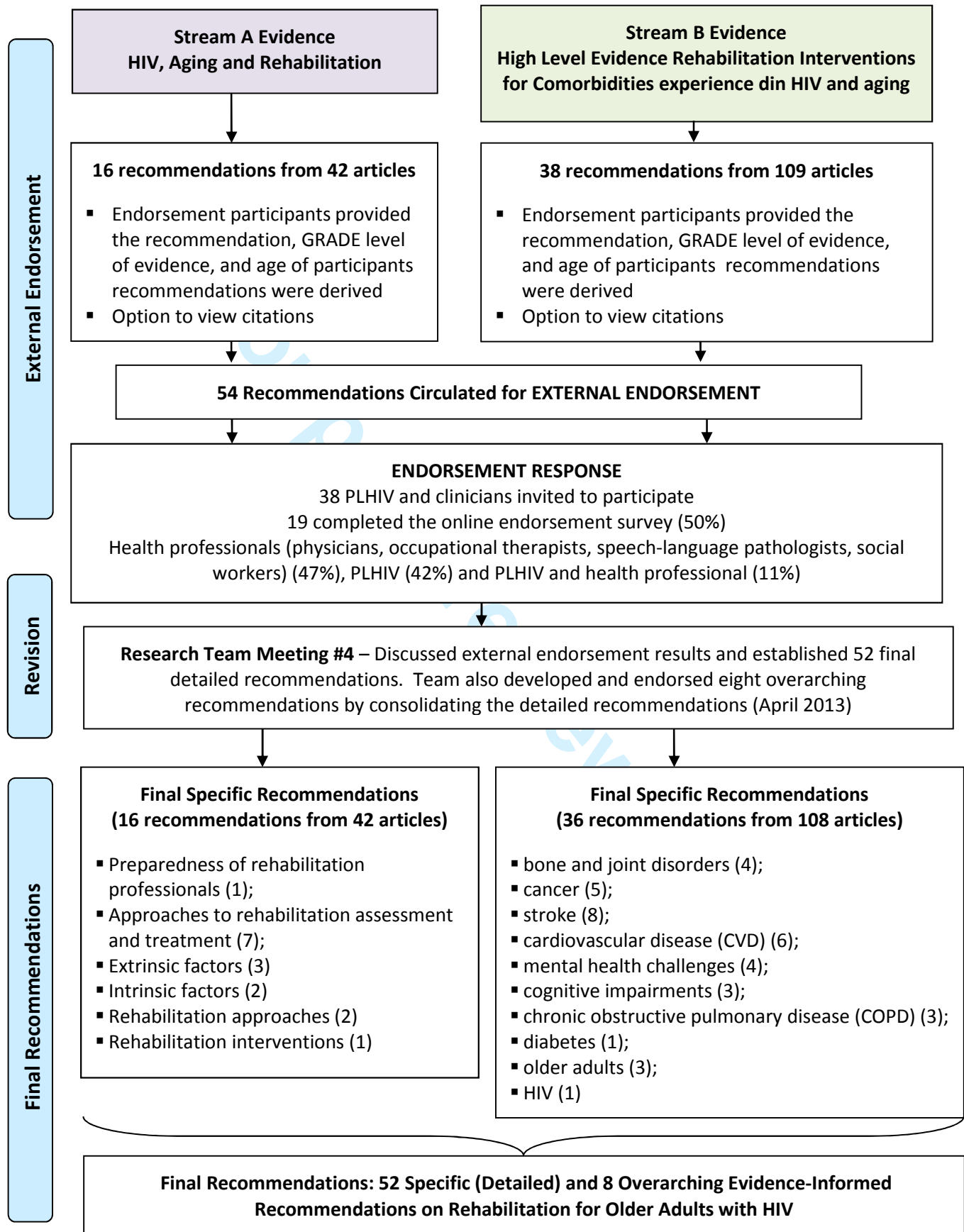


Figure 3: Overview of Knowledge Synthesis Procedure – External Endorsement (Phase 3)



Data Supplement File 1 –External Endorsement Results- Evidence Informed Recommendations in Rehabilitation for Older Adults Living with HIV

Of the 38 PHAs and clinicians invited to participate, 19 (50%) completed the endorsement survey. Of the 19 individuals, 9 (47.4%) were health professionals, 8 (42.1%) were people living with HIV and 2 (10.5%) were both a health professional and a person living with HIV. Health professional type included physicians (geriatrics and infectious diseases) (15.8%), occupational therapists (15.8%), speech-language pathologist (or therapist) (10.5%) and social workers (15.8%). We considered endorsement rates of >80%, 60-80% and <60% as high, moderate and low, respectively.

~Table reflects the draft recommendations sent for endorsement, hence the numbering and recommendations differ from the final recommendations presented in the Additional File 2 (Final Recommendations).

* indicates 1 missing response in level of endorsement

Number~	Draft Recommendation	Number of PLHIV and Clinicians who Endorsed the Recommendation (%)	# (%) who looked at Evidence Citations	Selected Comments from Endorsement Participants
1	Rehabilitation professionals should be prepared to provide care to older adults with HIV who present with complex comorbidities affecting neurological, cardiorespiratory and musculoskeletal systems that may result in physical, mental and social health challenges.	19 (100)	8 (42.1)	<p>Although many chronic illnesses lead to complex co-morbidities, HIV/AIDs brings with it stigma, secrecy and sometimes shame. Rehab professionals need to be prepared to adjust to this. Therefore rehab professionals need to be prepared to deal with HIV in particular.</p> <p>As a large part of the population living with HIV/AIDS ages, they encounter multiple complexities in daily life. The first step to preparing rehabilitation professions for this step would be a significantly greater understanding of the condition itself, and it's impact on daily life. Rehab professionals have a large focus on aging issues as a part of their scope of practice anyway. Hence, understanding the complex comorbidities that accompany aging with HIV is not too much of an additional burden, but can go a mile when needed.</p> <p>A good understanding of some of the mental health aspects of long term HIV care would be a great help.</p> <p>It makes sense but have not seen many older patients get rehabilitation.</p>

Number~	Draft Recommendation	Number of PLHIV and Clinicians who Endorsed the Recommendation (%)	# (%) who looked at Evidence Citations	Selected Comments from Endorsement Participants
2	<p>Rehabilitation professionals <u>should</u> adopt an individualized approach to assessment and treatment of older adults living with HIV to fully understand the unique and complex needs of older adults with HIV. This approach should consider the intersections between personal and social attributes (race, gender, sexual orientation, ethnocultural background and socioeconomic status) and the broader determinants of health (housing, access to health care, poverty, racism, financial supports, income support, education, work and parenting roles)</p>	19 (100)	7 (36.8)	<p>It's discouraging to see that evidence is low for many of these recommendations as we have now lived with HIV/AIDs for 30 years.</p> <p>Management of HIV/AIDS largely depends on personal factors such as resources and social support systems, as has been evident in my practice. Thus it is very important to apply an individualized approach to assessment and treatment, in order to provide the best client-centered care.</p> <p>Just as living with any other chronic illness, living with HIV/AIDS plays out very differently in individuals. In my practice, I have seen social support, socioeconomic status as well work status largely differ and impact clients differently. Hence it is very important to adapt an individualized approach.</p> <p>I personally think a unique approach is best in every rehab case.</p> <p>I endorse it however I feel that the above recommendation could and should be said about any individual patient or patient population.</p> <p>This is generally true for all rehab patients.</p>
3	<p>Rehabilitation professionals <u>should</u> consider assessing diversity of physical and mental health outcomes during assessment, which include but are not limited to outcomes of disability, quality of life, stress, coping, anxiety and depression, retirement and financial issues, sexual and familial relationships, loneliness and social networks, cognition, and daily function.</p>	19 (100)	8 (42.1)	<p>Rehab professionals may need to be ready to refer an HIV+ client with any of the above concerns as he or she may not be addressing them as well as they could be addressed.</p> <p>There should be services ready to help back up the findings of the assessment. For example, if a new client is assessed as depressed what is the plan for next steps?</p> <p>Mental health issues as responses to societal oppression</p>

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				I endorse it however I feel that the above recommendation could and should be said about any individual patient or patient population.
4	Rehabilitation professionals should assess both physical impairment and functional activity with older adults living with HIV given physical symptoms or impairments (such as limitations in aerobic capacity) may not always translate into challenges with functional activities.	16 (84.2)	9 (47.4)	<p>Having a focus on functional activities is especially important in regards to assessing independence and impact of HIV on aging.</p> <p>Being an occupational therapist, functional impact of any impairment is the chief focus of my practice. Just as other symptoms, any impairment can have different functional impacts within individuals depending on lifestyle and priorities.</p> <p>ADLs and IADLs are important aspects of a psychosocial assessment.</p> <p>I would think functional abilities and limitations would be of more interest/relevance to OTs vs. assessing aerobic capacity.</p> <p>We do this for all elderly rehab patients why would it be different for HIV.</p> <p>Interventions need to be holistic in all regards</p>
5	Rehabilitation professionals <u>should</u> incorporate mental health assessment and treatment into the care of older adults with HIV as they are at risk of experiencing low mood, anxiety, depression, and suicide ideation.	19 (100)	7 (36.8)	<p>Substance use, concurrent disorders are tied into HIV population in general and I think should be mentioned here. Aging, HIV, chronic illness, mental illness can increase an older person's risk for substance use even have they have never had problems before. I think Assessment of concurrent disorders is important when looking at Mental Health.</p> <p>Extremely important based on my friends' experiences living with HIV/AIDS.</p> <p>Assessment and treatment in this area should be beyond</p>

Number~	Draft Recommendation	Number of PLHIV and Clinicians who Endorsed the Recommendation (%)	# (%) who looked at Evidence Citations	Selected Comments from Endorsement Participants
6	Rehabilitation professionals <u>should</u> conduct regular neurocognitive screening with older adults living with HIV, and where indicated, conduct complete assessments to identify early signs of HIV-associated executive functioning deficits (e.g. ability to keep appointments, adhere to medication regimens, and follow-up on recommendations) and interventions to effectively reduce or prevent cognitive impairments.	16 (84.2)	10 (52.6)	<p>the common understanding that PHAs experience episodes of depression; including social interactions, active daily living activities and other health related issues that may impact more broadly as people age - with or without a health issue.</p> <p>Since HIV/AIDS appears as more of a chronic condition in today's world, rather than a life threatening one, a lot of the symptoms have to be dealt with over a long period of time including access/intake of medications, management of side effects and maintaining relationships. All of which, much like other chronic conditions such as chronic pain, cancer, etc. can have an impact on the mental health of the person involved. Thus a focus on mental health assessment and treatment should be included.</p> <p>It is important to listen to every rehab client and to learn from them what their experience has been.</p> <p>Co-infected HIV/HCV may be at elevated risk for neurocognitive impairment.</p> <p>I agree but would recommend adding words "compensate" or "support" in addition to "prevent"/"reduce" as this may be the more realistic goal.</p> <p>I thought that there was significant evidence for early onset of cognitive impairments for many PHAs.</p> <p>Neurocognitive screening should be incorporated as standard practice in the treatment of HIV at all levels, and is currently often not addressed. This particularly needs to be incorporated in dealing with PHAs and aging.</p> <p>I had 1 patient with HIV CNS changes and this was very important.</p>

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				<p>In my practice, I realized that neurocognitive issues were a significant part of my assessment and intervention strategies, as they impact many adults living with HIV. When you combine in the aging factor, this area becomes even more important to focus on.</p>
7	<p>Rehabilitation professionals <u>should</u> be aware of the potential impact of uncertainty among older adults with HIV and the psychological importance for some older adults to know the source of their symptoms (age-related versus HIV-related versus medication-related).</p>	17 (89.5)	8 (42.1)	<p>Life can be a roller coaster of unforeseen illnesses and impairments for PHAs.</p> <p>I would endorse this as one of strongest areas that needs to be looked at and addressed and very much like that it addresses age-related versus HIV or medication related as far too often this area is determined to be illness or treatment related.</p> <p>Uncertainty is a factor for maybe older clients.</p> <p>Yes! Symptom ambiguity is a key area of understanding lived experiences of this population.</p> <p>True - just as rehab professionals should be aware of uncertainty of all chronic illnesses.</p> <p>Without Blood level monitoring for HIV drugs how would this be informed information?</p> <p>While this generally may be relevant for other aging and health challenges, it is very unique and important in the context of HIV and needs to be properly acknowledged and addressed.</p>
8	<p>Rehabilitation professionals <u>should</u> consider the risk of social exclusion older adults with HIV may face in relation to race, ethnicity, gender, and sexual orientation in their assessment.</p>	18 (94.7)	7 (36.8)	<p>Isolation seems to be common among those I know who are HIV+ or who have AIDS.</p> <p>It seems this statement neglects to consider the very real possibility of social exclusion based simply on HIV status.</p> <p>Perhaps HIV and age-related stigma should be included in</p>

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				<p>the language here?</p> <p>Internalized HIV Stigma and personal view on Discrimination also feeds into this in a Major way Do I withdraw and Isolate??</p> <p>Perhaps this should also include a recommendation around assessing of social networks/supports.</p>
9	Rehabilitation professionals <u>should</u> be knowledgeable of ageism as an added layer of stigma that may increase existing HIV stigma and homophobia experienced by older adults with HIV.	17 (89.5)	10 (52.6)	<p>This is especially important with the MSM community as ageism is a problem in the community with HIV....</p> <p>Experiences with my own life and with those of friends when dealing with elderly parents has opened my eyes to the pervasiveness of family, friends, caregivers and health providers looking to what they call the best interests of the elderly and not to their expressed interests which have precedent in law.</p> <p>Ageism exists in rehab. It is unpleasant to experience it, and can be very dis-heartening.</p> <p>See previous comment- absolutely. Interweaving oppression. Language should reflect not additive "isms", but rather a multiplicative effect that mutually co-construct and reinforce each other.</p> <p>I think this applies to all elderly, not just HIV.</p> <p>As I get older I have become aware that there is little to no communication platform for younger and older Gays and as an older gay man it has been hammered in to me about the appropriateness of these relationships, often I am left feeling like I am a predator rather than an Elder.</p>
10	Rehabilitation professionals <u>should</u> understand the implications of HIV disclosure among older adults with HIV, be respectful of individualized choice	17 (89.5)	8 (42.1)	<p>Strongly agree.</p> <p>I feel this statement is an excellent start but that 'implications of HIV Disclosure' should be further flushed</p>

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	surrounding disclosure and be prepared to discuss ways to ensure clients obtain the necessary supports surrounding disclosure.			<p>out...even if just to indicate where the implications may lie (social, legal, etc).</p> <p>Everyone wants privacy, especially, surrounding disease or disability. I know many who have experienced a lack of understanding in regards to their status.</p> <p>The rehabilitation professional should be part of a team to address these issues - this implies it is done in isolation a working as.</p> <p>I'm not sure I understand ALL the implications around disclosure after being infected for 25 years.</p> <p>HIV criminal law is a significant issue that will continue to impact PHAs including aging PHAs, many of whom may still be sexually active. This will be an important topic for care givers to have basic knowledge, proper referrals and strong/clear policies and procedures in place.</p>
11	Rehabilitation professionals <u>should</u> be knowledgeable about the importance of social relationships and the need for emotional and practical social support to maximize physical, mental and psychological well-being for older adults with HIV.	18 (94.7)	10 (52.6)	Social support plays a very important part in the success of any treatment/intervention plans with people living with HIV, especially those of older adults. Hence it is important to understand the impact (positive or negative) of the client's closest relationships as well as their social circle in general while assessing and planning their course of treatment.
12	Rehabilitation professionals <u>should</u> consider the role of self-management strategies to promote health and wellness among older adults living with HIV.	18 (94.7)	9 (47.4)	<p>The rehab recommendations may be used for several years. Self management to the best degree is vital.</p> <p>Self-management strategies such as learning to cope with pain, managing medications efficiently are some of the interventions that have worked very well with people living with HIV in my practice.</p> <p>Is there a way to determine whether or not someone has Healthy coping strategies or not How would resilience be determined?</p>

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13	Rehabilitation professionals <u>may consider</u> the importance and role of spirituality in the health of older adults with HIV depending on the individual.	16 (84.2)	7 (36.8)	<p>I see spirituality as including the expression of humanity and commonalities between health providers and PHAs.</p> <p>I am very pleased to see this area included and strongly support this recommendation. Quite often overlooked at any stage of HIV infection and other health-related issues.</p> <p>It was something I needed and had to search for. Not sure how important it is to the HIV community specifically.</p> <p>Very important in my experience.</p> <p>We have left Spirituality out of many conversations because it is too contentious, it needs to be reintroduced. The fruit of the Spirit is Love, Joy, Peace, Patience, Kindness Goodness, Faithfulness, Gentleness and Self-control. Quote from Rev. Brent Hawkes.</p> <p>I actually think professionals SHOULD consider this, however, it's very complicated and most professionals would not differentiate religion from spirituality which would often be quite negative so this recommendation makes sense in that regard.</p>
14	Rehabilitation professionals <u>should</u> use an interprofessional approach to practice that is sensitive to the unique and individualized values and preferences of older adults with HIV while considering issues of culture, stigma and discrimination. Specifically rehabilitation professionals should communicate information surrounding care, treatment and education in a way is tailored to the specific needs of older adults with HIV to optimize physical and mental health and well-being.	18 (84.7)	9 (47.4)	<p>Strongly endorse this recommendation.</p> <p>Holistic approaches seem to work best.</p> <p>Each individual in spite of disease or disability has similar needs.</p> <p>As rehab professionals, it is very important to adapt an inter-professional approach to provide client centered care. Clients may need better interpretation of impairments described to them by their doctors in terms of functional limitations, or strategies to overcome these limitations. Hence open dialogue is very necessary within the treatment</p>

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				team to better plan care.kakk
15	Rehabilitation professionals <u>should</u> inquire about the nature and extent to which older adults with HIV use complementary and alternative medicine (CAM) and consider the potential benefits and side effects of CAM interventions.	16 (84.2)	9 (47.4)	For many PHAs these options are financially out of reach. Still would be good to know for the rehab provider.
16	Exercise (specifically progressive resistive exercise) <u>may be recommended</u> for associated improvements in strength, body composition, and physical fitness in older adults living with HIV. Specifically, resistive exercise may be considered for use among older adults who are frail or debilitated to increase muscle strength and mitigate wasting.	15 (78.9)	8 (42.1)	I do this kind of work every day with seniors and with people living with dementia. I am a believer, but find few want to pay to get good fitness provided in this area. For older patients I think you have to tailor the degree or exercise to the degree of frailty. Probably works for everyone.
17	Aerobic and resistive exercise <u>may be recommended</u> for at least 20 minutes at least 3 times per week for at least 5 weeks for older adults living with HIV who are medically stable with the potential to maintain or enhance outcomes of cardiopulmonary fitness, weight and body composition, strength, and quality of life.	16 (84.2)	9 (47.4)	Are there no studies using the benefits of Yoga or Tai Chi for older populations it would seem to be a more holistic with its combination of strength, balance, agility, and mental focus.
18	Regular forms of exercise including (strength/resistance training, aerobic/cardiovascular endurance training, and balance/stability training) may be <u>strongly recommended</u> for older adults with HIV who are medically stable to reduce fall rates, improve functional and physical performance, improve cardiopulmonary fitness, reduce depressive symptoms, and improve mood and quality of life.	16 (84.2)	8 (42.1)	Poverty among PHAs means that home-based exercise may be the only viable option. I don't like home based there is no added value like interpersonal contact and association Group energy can be synergistic.
19	Multidisciplinary forms of rehabilitation is strongly recommended for older adults	18 (94.7)	8 (42.1)	I more strongly endorse follow up with a similar course of action to avoid re-hospitalization.

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	with HIV who are hospitalized to promote earlier discharge directly home from hospital and reduced costs associated with hospitalization.			PT/OT/SW trifecta works well in emergency environments and others. This is critical.
20	Occupational therapy may be an important component of rehabilitation for older adults living with HIV with functional impairments and is strongly recommended for elderly community dwellers, specifically for advising on adaptive devices; mobility devices; energy conservation; cognitive training; training of skills to use adaptive devices to enhance functional ability, and to enhance social participation and quality of life.	18 (94.7)	8 (42.1)	In my practice with people living with HIV, I have found an indispensable role for OT in terms of areas described above such as adaptive devices, mobility devices, energy conservation and cognitive strategies. OT was well received. Is training on using social media part of this?? i.e. computer training and the use of things like learning about facebook or even how to set up your own blog or how to find web sites and information in searches??
21	Supervised exercise sessions <u>should be recommended</u> to older adults living with HIV with knee and/or hip osteoarthritis (OA) who are medically stable to improve pain and physical function. A combination of low impact exercise in the form of jogging, stair climbing and walking, combining with high-magnitude resistance training should be recommended for older adults with HIV to preserve bone mineral density.	14 (73.7)	6 (31.6)	Need to recognize the feasibility of implementing these types of supervised programs accepting the other social issues in HIV. Although I don't agree that these should be the only options explored again Yoga and tai chi also provide good results maybe just not researched well. I endorse based on this process and evidence but have no personal or direct professional opinion.
22	Balance and strengthening exercises <u>should</u> be part of an overall exercise program to decrease falls and risk of fall-related fractures for older adults with HIV and low bone mineral density (BMD).	17 (89.5)	7 (36.8)	No comments
23	Multidisciplinary rehabilitation teams comprised of OT and PT across the continuum of care should be recommended for older adults with HIV who sustain a hip fracture. Specifically,	16 (84.2)	6 (31.6)	If a high frequency program was available as an outpatient could this possibly be as good as inpatient? My experience with the elderly in long-term care homes showed me that rehab programming for the elderly was

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	inpatient geriatric rehabilitation programs are strongly recommended and may be an ideal intervention as they have the potential to reduce nursing home admission, mortality and improve functional status.			minimal. As time passed person after person lost mobility leading eventually to life in a wheel chair. So spend some time on determining which interventions and outcomes would be most suitable.
24	Self-management programs may be considered as a component of a rehabilitation program to address disability and pain for older adults living with HIV and arthritis.	15 (78.9)	7 (36.8)	How well would these work in HIV with other issues? It would depend on the person's ability of self-discipline.
25	A combination of aerobic and resistance exercise at moderate intensity <u>may be recommended</u> for older adults living with HIV and cancer to reduce cancer-related fatigue during and after treatment for cancer. Any exercise intervention should be individualized based on the targeted health outcome and cancer type.	14 (73.7)	8 (42.1)	Too often we look at our limitations NOT what we can still do or how we just do it differently. I endorse based on this process and evidence but have no personal or direct professional opinion.
26	A combination of aerobic and resistive exercise at least twice a week for at least 2 weeks at 50-90% VO2max intensity is safe and <u>may be recommended</u> for older adults living with cancer for improvements in physiological measures, symptoms, physical and psychosocial functioning of patients and health-related QOL. Positive effects of exercise may vary significantly as a function of the type of cancer; the stage of disease; the medical treatment; the nature, intensity, and duration of the exercise program; and the lifestyle of the patient.	13 (68.4)	6 (31.6)	I endorse based on this process and evidence but have no personal or direct professional opinion.
27	Exercise may be beneficial for self-empowerment and <u>should</u> be recommended for older adults living with HIV who are also living with lung cancer	14 (73.7)	7 (36.8)	I endorse based on this process and evidence but have no personal or direct professional opinion.

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28	<p>who are medically stable.</p> <p>Supervised aerobic exercise programmes should be included during breast cancer treatment for the management of cancer related fatigue for older women living with HIV and breast cancer who are medically stable. A combination of aerobic and resistive exercise at least 3 times per week for at least 6 weeks, 30-40 minutes per session, at moderate intensity (e.g. rate of perceived exertion 11-13 out of 20) appears to be safe and may be recommended for older women living with HIV undergoing or who have undergone treatment for breast cancer and who are medically stable for potential improvements in cardiopulmonary fitness, physical functioning, fatigue, and body composition and quality of life.</p>	14 (73.7)	7 (36.8)	<p>although all these may be needed to be presented as a longitudinal lifestyle change not just short term interventions.</p> <p>I endorse based on this process and evidence but have no personal or direct professional opinion.</p>
29	<p>A combination of aerobic and resistive exercise <u>may be recommended</u> for older adults living with HIV and metastatic cancer (either HIV-related or not) who are medically stable for improvements in quality of life and physical health status.</p>	10 (52.6) <i>[deleted from the final recommendations]</i>	8 (42.1)	<p>Not all HEALING requires a CURE. Acceptance doesn't preclude fighting.</p> <p>I endorse based on this process and evidence but have no personal or direct professional opinion.</p>
30	<p>Inconclusive or insufficient evidence exists to derive recommendations for cognitive rehabilitation interventions for older adults with HIV and stroke. While cognitive rehabilitation does not appear harmful, weak evidence exists to support the use of cognitive-specific interventions to improve spatial neglect, disability, memory, and functional status for older adults who experience stroke. Rehabilitation professionals should implement specific task oriented training</p>	19 (100)	6 (31.6)	<p>There needs to be age targets for baseline determinants.</p> <p>Key to determine baseline and monitor for non-stroke related cognitive issues and required support/care.</p>

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	with older adults living with HIV and stroke as this approach is key to retraining skill specific tasks related to function.			
31	Stroke rehabilitation for older adults with HIV <u>should</u> multi-disciplinary including occupational therapy, physical therapy, and speech-language pathology to improve the ability to undertake personal activities of daily living and reduce risk of deterioration in ability. Stroke rehabilitation may include the following components: therapeutic exercise, task-oriented training, gait-oriented training, balance training, strength training, wheelchair mobility, home modification, cognitive adaptation, and treatment of shoulder subluxation for those who experience a sub-acute or post-acute stroke (within 1 year).	19 (100)	7 (36.8)	No comments
32	There exists inconclusive or insufficient evidence on the effectiveness of long-term rehabilitation interventions on patient or carer outcomes 1 year post stroke are to provide a recommendation for older adults with HIV and stroke.	*9 (47.4) <i>[deleted from final recommendations]</i>	8 (42.1)	I do not understand this recommendation. I'm unclear as to what is recommended here - further action or no action after a year. I see improvements in post-stroke patients days, weeks, months and years after their strokes. I found the wording of that recommendation confusing - I am not sure what the exact recommendation is.
33	Occupational therapy <u>should</u> be recommended as a component of rehabilitation for older adults living with HIV with stroke as interventions targeted towards personal activities of daily living may increase ADLs and reduced death, deterioration and dependency.	17 (89.5)	7 (36.8)	No Comments
34	Physiotherapy comprised of a	17 (89.5)	5 (26.3)	I endorse based on this process and evidence but have no

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	combination of interventions <u>should</u> be recommended for the recovery of postural control and lower limb function for older adults living with HIV following stroke.			personal or direct professional opinion.
35	Electromechanical-assisted gait training in combination with physiotherapy <u>may be recommended</u> for older adults living with HIV with stroke (particularly those within 3 months post stroke) as this intervention is associated with a higher likelihood to achieve independent walking than gait training alone.	12 (63.2)	5 (26.3)	I endorse based on this process and evidence but have no personal or direct professional opinion.
36	Combined aerobic and resistive exercise <u>should</u> be a component of stroke rehabilitation for older adults living with HIV with stroke who are medically stable at any stage of motor recovery. Higher doses of exercise may be associated with better motor recovery. Specifically, cardiorespiratory training should be a component of exercise as evidence suggests speed, tolerance and independence during walking are improved. Specifically, strength training may be a component as this can improve muscle strength in stroke patients and will not necessarily increase spasticity.	15 (78.9)	4 (21.1)	No Comments
37	Electrotherapeutic modalities <u>alone are not recommended</u> for older adults living with HIV with stroke over conventional rehabilitation interventions strategies. There exists very weak to no evidence to support the use of electrotherapeutic modalities (functional electrical stimulation, biofeedback, visual feedback therapy) over conventional PT	10 (52.6)	4 (21.1)	No Comments

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	interventions along for muscle strength recovery, upper limb recovery or balance post stroke.			
38	Cardiac rehabilitation in the form of home-based or centre-based care <u>may be recommended</u> because these appear equally effective in improving the clinical & health related quality of life outcomes for older adults with HIV with low risk cardiovascular disease. The choice of home versus centre-based care should be reflective of the individual preference of the patient as this may impact the uptake of rehabilitation.	15 (78.9)	6 (31.6)	Strongly support this recommendation.
39	Cardiac rehabilitation for older adults with HIV should include reinforcement, feedback, offer opportunity for individualization, facilitate behaviour change through skills and resources and be relevant to patients needs and abilities. Specifically, motivational communication such as formal cardiac rehabilitation program referral, reminder letters, phone calls and home visits may be recommended for increasing uptake and adherence of cardiac rehabilitation among older adults living with HIV and cardiovascular disease.	16 (84.2)	5 (26.3)	Would this include an ability to determine emotional state depression would affect motivation?
40	Exercise-based cardiac rehabilitation <u>should be recommended</u> for older adults with HIV who have undergone a myocardial infarction (MI) (otherwise known as a heart attack) (or at risk of an MI) given evidence suggests exercise based cardiac rehabilitation is effective in reducing cardiac deaths. The ideal frequency, intensity, time and type of	*14 (73.7)	4 (21.1)	Endorse based on this process and evidence but have no personal or direct professional opinion.

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	exercise to maximize benefits are unclear. Early mobilization and rehabilitation and specifically, secondary and tertiary prevention programs (including counseling, education, and exercise) should be recommended to older adults living with HIV who experience an MI as these have the potential to reduce subsequent MI and mortality and improve processes of care, risk factor profiles and functional status and quality of life.			
41	Moderate intensity exercise (and potentially progressive resistive exercise) should be recommended for older adults with HIV with cardiovascular disease who are medically stable to reduce high blood pressure and potentially mitigate the effect of coronary heart disease. Exercise may be associated with improved cardiovascular health and well-being as a result of enhanced self-efficacy. More research is required to determine the ideal frequency and duration of exercise that should be recommended to see psychological improvement. High intensity aerobic exercise may increase HDL-C levels, while combined aerobic and resistance exercise may lower LDL-C levels and should be recommended for older adults with HIV to improve their cardiovascular health.	16 (84.2)	5 (26.3)	Again I refer to yoga.
42	Home-based moderate intensity exercise (and potentially progressive resistive exercise) as well as supervised and hospital-based exercise programs appear to be safe and <u>should be recommended</u> for older adults with HIV and heart failure	*14 (73.7)	4 (21.1)	I think that what is not addressed for many of these recommendations is lack of funding for them at home or in day care settings. Programs need not be hospital based.... development of community partner links would probably be more cost

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	who are medically stable for potential improvements in cardiac function, exercise capacity (including peak oxygen consumption), physical function, mortality and quality of life and potentially a reduction in hospital admissions. Optimal session frequency, session duration, exercise intensity, program duration is unclear.			effective and affordable for all parties senior programs may need better development and funding.
43	Aerobic exercise (and possibly resistive exercise) at least 3 times per week may be recommended to older adults living with HIV and hyperlipidemia for the potential to improve blood lipids. Clinical importance of the changes are questionable.	*14 (73.7)	3 (15.8)	<p>Recommending fitness is not enough. There should be programs to help the client succeed with the fitness recommendations.</p> <p>I endorse based on this process and evidence but have no personal or direct professional opinion.</p>
44	Inconclusive or insufficient evidence exists to support a recommendation for a specific model of mental health care (acute psychogeriatric care over acute psychiatric units versus other mental health services) for older adults with HIV living with mental health issues. More research is needed before recommending one model of care over another.	17 (89.5)	6 (31.6)	Do we have the resources to be able to ask care units to engage in this kind of placement strategy or patient tracking?
45	Exercise appears safe and <u>should be recommended</u> (approximately 30 minutes per session) to older adults with HIV living with other chronic conditions illnesses such as CVD, cancer, chronic pain, fibromyalgia as a way to mitigate symptoms of anxiety.	16 (84.2)	6 (31.6)	<p>Not sure about the second part "to mitigate anxiety" in this population of HIV positive.</p> <p>There is an old exercise regime for the cure or relief of fibromyalgia I'm not convinced that my pain level isn't a function of time accumulation without relief of pain my pain isn't treated and so my pain just keeps being reinforced AND added to daily.</p>
46	Inconclusive or insufficient evidence exists to support the use of cognitive behavioural therapy with older adults with HIV and depression.	14 (73.7)	9 (47.4)	<p>Is there any information on Mindfulness Based Approach?</p> <p>I'm unclear as to what is recommended - action or no action.</p>

Number~	Draft Recommendation	Number of PLHIV and Clinicians who Endorsed the Recommendation (%)	# (%) who looked at Evidence Citations	Selected Comments from Endorsement Participants
				<p>Regardless of intervention, metastudies show that it is the nature of the therapeutic relationship that makes the difference, therefore, clinicians should be able to work in a multitude of cognitive, behavioural, and emotion-focused modes of treatment.</p> <p>It would have to be individually based as to whether someone would benefit from cognitive behavioral therapy (CBT) - and not diagnosis/population based.</p> <p>This has worked for me I have many learned tools in my kit some I use daily.</p> <p>You should however mention that there is strong evidence for CBT (at least I thought there was) for CBT in younger adults with HIV.</p> <p>Anecdotally, CBT and other mental health interventions are important resources and options for good care.</p>
47	Supporting older adults living with HIV in securing safe and stable housing <u>should</u> be an important component of the rehabilitation process for older adults with HIV with severe mental illness given the positive impact of stable housing for this target population.	18 (94.7)	6 (31.6)	<p>Highly important, given the high levels of poverty among PHAs.</p> <p>Yes, in many cases housing first strategies are successful in mitigating mental health issues.</p> <p>Safe and secure housing should be a right for ALL people please refer to Positive spaces, Healthy spaces study.</p>
48	Cognitive interventions including cognitive training, cognitive stimulation, and cognitive rehabilitation <u>should</u> be recommended for older adults living with HIV with mild cognitive impairment because they are associated with significant improvements objective and subjective measures of memory, quality of life and mood / anxiety with benefits translated to improvements in daily	17 (89.5)	7 (36.8)	It is unclear whether this applies to HIV associated dementia Probably wouldn't hurt but may be expensive and resource intensive.

Number~	Draft Recommendation	Number of PLHIV and Clinicians who Endorsed the Recommendation (%)	# (%) who looked at Evidence Citations	Selected Comments from Endorsement Participants
	functioning and mood. Specifically, errorless learning may be recommended for a potential positive effect on recall for older adults with HIV and cognitive impairment.			
49	A combination of aerobic and resistive (strengthening) exercise <u>should be recommended</u> for older adults living with HIV with cognitive impairment for improvements in fitness, physical function, cognitive function, and positive behavior. Evidence suggests older adults with cognitive impairment may benefit from exercise as much as older adults with no cognitive impairment. Due to diversity in exercise programs, measures of cognition, and study populations in the evidence, the optional type of exercise program (content, intensity, frequency, and duration) is unclear. Specifically, aerobic exercise may be associated with improvements in neurocognitive function among older adults with HIV with cognitive impairment for attention and processing speed, executive function, and memory.	18 (94.7)	7 (36.8)	Again yoga utilizes mental focus for exercises.
50	Physical exercise appears to be safe and may be recommended for older adults living with HIV and dementia however insufficient evidence exists to suggest benefits to cognition, function, behaviour, depression, and mortality.	15 (78.9)	6 (31.6)	I lead a dementia friendly class twice a week. The results are great and the group shows up consistently and we have fun.
51	Pulmonary rehabilitation (including upper and lower extremity exercise, inspiratory muscle training and breathing exercises) for at least four weeks is <u>safe and strongly recommended</u> for older adults living with	14 (73.7)	5 (26.3)	Important, given high levels of smoking at some point in lifetime among PHAs. C032- This needs to be rolled out as a lifestyle change not just short term intervention.

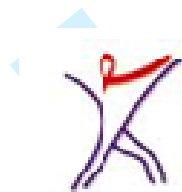
Number~	Draft Recommendation	Number of PLHIV and Clinicians who Endorsed the Recommendation (%)	# (%) who looked at Evidence Citations	Selected Comments from Endorsement Participants
	<p>HIV who have COPD to reduce mortality, improve dyspnea, health-related quality of life, functional exercise capacity and reduce future hospital admissions. Individuals with more severe COPD may require longer rehabilitation programs of at least 6 months to demonstrate benefits.</p>			<p>I endorse based on this process and evidence but have no personal or direct professional opinion.</p>
52	<p>Aerobic and progressive resistance exercise at least two times per week for at least 8 weeks appears feasible, safe and may be recommended for older adults with HIV with mild to moderate COPD for improvements in exercise capacity and muscle strength that may translate into improved activity performance and societal participation. Careful consideration is required when prescribing progressive resistance exercise programs for people with COPD who have comorbid health conditions.</p>	13 (68.4)	4 (21.1)	<p>I endorse based on this process and evidence but have no personal or direct professional opinion.</p>
53	<p>Inspiratory muscle training (IMT) in the form of targeted, threshold or normocapneic hyperventilation is an important component of pulmonary rehabilitation and is <u>strongly recommended</u> for older adults living with HIV with COPD to improve inspiratory muscle strength and endurance, dyspnea, exercise capacity and quality of life. Optimal frequency, intensity, supervision and duration of IMT is unclear.</p>	12 (63.2)	5 (26.3)	<p>I endorse based on this process and evidence but have no personal or direct professional opinion.</p>
54	<p>Aerobic resistive exercise for at least 8 weeks is strongly recommended for older adults living with HIV with diabetes (type 2) to improve cardiopulmonary fitness and ensure glucose control. Optimal</p>	17 (89.5)	(21.1)	<p>What happens after 8 weeks - it doesn't work or they should stop.</p> <p>Important since diabetes is increasingly seen in PHAs as a result of treatment side effects.</p>

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Number~	Draft Recommendation	Number of PLHIV and Clinicians who Endorsed the Recommendation (%)	# (%) who looked at Evidence Citations	Selected Comments from Endorsement Participants
	frequency, intensity, time and type of exercise are unclear however evidence suggests increased exercise prescription, fitness testing, supervision and group sessions at a greater number of times per week may be associated with greater health benefits.			



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Canadian Working Group on HIV and Rehabilitation

Groupe de travail canadien sur le VIH et la réinsertion sociale

Evidence-Informed Recommendations in Rehabilitation for Older Adults Living HIV

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Evidence-Informed Recommendations in Rehabilitation for Older Adults Living HIV

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Executive Summary

Adults aging with HIV are living with the physical, social and psychological consequences of HIV disease, long term treatment, and comorbidities associated with aging. Rehabilitation including occupational therapy, physical therapy and speech-language pathology, can assist in managing the health related challenges or disability associated with HIV and aging.

Our aim was to develop clinical evidence-informed recommendations on rehabilitation for older adults living with HIV.

We conducted a knowledge synthesis, combining research evidence specific to HIV, rehabilitation and aging, with evidence on rehabilitation interventions for common comorbidities experienced by older adults with HIV. We searched for and included: highly relevant HIV-specific research addressing rehabilitation and aging (Stream A) and high-quality evidence (systematic reviews and meta-analyses) on the effectiveness of rehabilitation interventions for comorbidities commonly experienced by older adults aging with HIV (specifically bone and joint disorders, cancer, cardiovascular disease, mental health, neurocognitive decline, cardiopulmonary disease, diabetes) (Stream B). We extracted and synthesized relevant data from included studies to draft evidence-informed recommendations on rehabilitation for older adults aging with HIV. Draft specific recommendations were refined based on people living with HIV (PLHIV) and clinician's values and preferences, reviewed by an inter professional team for GRADE (quality) rating and revision, and then circulated to a new group of PLHIV and clinicians for external endorsement and final refinement. We then consolidated the detailed specific recommendations into overarching recommendations to broadly guide rehabilitation for older adults with HIV.

This synthesis yielded eight overarching and 52 specific recommendations. Thirty-six specific recommendations were derived from 108 moderate or high level research evidence articles (meta-analyses and systematic reviews) that described the effectiveness of rehabilitation interventions for adults living with health conditions that may be experienced by older adults with HIV. Recommendations address specific rehabilitation interventions across eight health conditions experienced by older adults with HIV: bone and joint disorders, cancer, stroke, cardiovascular disease, mental health issues, cognitive impairments, chronic obstructive pulmonary disease, and diabetes. Sixteen specific recommendations were derived from 42 research evidence articles specific to rehabilitation for older adults with HIV. The quality of evidence from which these recommendations were derived was either low or very low, consisting primarily of narrative reviews or descriptive studies with small sample sizes. These recommendations address approaches to rehabilitation assessment and interventions, and contextual factors to consider with rehabilitation of older adults living with HIV.

Overall, we established eight overarching and 52 specific evidence-informed recommendations from a combination of low level evidence specific to HIV, aging and rehabilitation, and high level research evidence describing the effectiveness of rehabilitation interventions for comorbidities that may be experienced by older adults with HIV. PLHIV and clinician values and preferences were integral in developing these recommendations. These evidence-informed recommendations

1
 2 provide a comprehensive guide for rehabilitation with older adults with HIV and those who may
 3 present with comorbidities.
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 6 **How are the Recommendations Presented in this Document?**

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 8 The evidence-informed recommendations on rehabilitation for older adults living with HIV are
 9 presented in the form of overarching and specific detailed recommendations. Specific
 10 recommendations are presented in two streams that represent the two different bodies of
 11 research evidence from which the recommendations were derived.
 12

13
 14 ***Specific Recommendations***

15
 16 Results for the first part of the synthesis (Stream A) include 16 recommendations derived from 42
 17 research evidence articles specific to rehabilitation for older adults living with HIV. The level of
 18 evidence from which these recommendations were derived was either low or very low, meaning
 19 the articles were mostly narrative review articles or descriptive studies (either qualitative or
 20 quantitative) with small sample sizes. Even though a recommendation may be derived from low
 21 level evidence, it still may be highly endorsed if found to make good clinical and experiential sense
 22 from the perspective of clinicians or PLHIV.
 23

24
 25 Results for the second part of the synthesis (Stream B) include 36 recommendations derived from
 26 108 moderate or high level research evidence articles (meta analyses and systematic reviews)
 27 describing the effectiveness of rehabilitation interventions for adults living with comorbidities that
 28 may be experienced by older adults with HIV.
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30
 31 All specific recommendations were reviewed and revised three times with the synthesis team that
 32 includes researchers, clinicians and people living with HIV. All specific recommendations were also
 33 circulated to 17 PLHIV and clinicians who work in HIV care for endorsement.
 34

35
 36 ***Overarching Recommendations***

37
 38 To facilitate knowledge transfer and exchange, it became apparent that we needed to establish
 39 overarching recommendations that summarized the detailed recommendations in a condensed
 40 manner. We consolidated the 52 specific (or detailed) recommendations into eight overarching
 41 recommendations on rehabilitation for older adults living with HIV. These recommendations
 42 provide a broader and more general overview of the evidence synthesis.
 43

44
 45 **How can the Recommendations be used?**

46
 47 We present an overview of the overarching recommendations followed by the more specific
 48 (detailed) recommendations. Overarching recommendations may be used by any rehabilitation
 49 professional and other health providers who may potentially work with older adults living with HIV
 50 in their practice. Specific (or detailed) recommendations may be used by rehabilitation
 51 professionals and other health providers working with older adults living with HIV who would like
 52 more specific guidance on evidence-informed recommendations for interventions across specific
 53 comorbidities.
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Overarching recommendations in rehabilitation for older adults living with HIV

We offer eight overarching recommendations derived from the 52 specific recommendations that were developed from evidence specific to rehabilitation for older adults with HIV as well as high level evidence on rehabilitation interventions across comorbidities commonly experienced by older adults with HIV. The following recommendations serve as a general guide to providing rehabilitation care, treatment and support with older adults living with HIV.

For each general recommendation, where applicable, we refer to the specific (or detailed) recommendations from which they were derived.

Summary Recommendation 1: Rehabilitation professionals should be prepared to provide care to older adults with HIV who present with **complex comorbidities** affecting neurological, cardiorespiratory and musculoskeletal systems that may result in physical, mental and social health challenges. *(original detailed recommendation #1)*

Summary Recommendation 2: Rehabilitation professionals should adopt an **individualized and interprofessional approach to practice** that is sensitive to the **unique values, preferences and needs of older adults with HIV**. This approach should include comprehensive assessment and treatment of **physical, neurocognitive and mental health impairments, uncertainty (or worrying about the future), functional activity limitations, and social exclusion** while considering the intersections between **personal and social attributes** and the **broader determinants of health**. *(combination of detailed recommendations #2 – 8, 14, and 18)*

Summary Recommendation 3: Multidisciplinary rehabilitation including physical therapy, occupational therapy and speech-language pathology is strongly recommended across the **continuum of care** (acute, rehabilitation and community-based care) for older adults with HIV to address the multi-dimensional and episodic nature of disability attributed to HIV and its comorbidities such as bone and joint disorders, cancer, stroke, cardiovascular disease, mental health, cognitive impairment, chronic obstructive pulmonary disease (COPD) and diabetes. *(combination of detailed recommendations #14, 18, 20 and 23)*

Summary Recommendation 4: Rehabilitation professionals should consider the role of **extrinsic contextual factors** such as stigma and ageism, HIV disclosure, and emotional and practical social supports on the health and well-being of older adults living with HIV. *(combination of detailed recommendations #9-11)*

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3 **Summary Recommendation 5:** Rehabilitation professionals should consider the role of **intrinsic**
4 **contextual factors** such as self-management and spirituality on the health and well-being of older adults
5 living with HIV. (*combination of detailed recommendations #12-13*).

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8 **Summary Recommendation 6:** A **combination of aerobic and resistive exercise** may be recommended for
9 older adults living with HIV who are medically stable and living with comorbidities including bone and joint
10 disorders, cancer, stroke, cardiovascular disease, stroke, mental health, cognitive impairment, chronic
11 obstructive pulmonary disease (COPD), and diabetes. The frequency, intensity, time and type of exercise
12 should be individually tailored to the specific goals and capacity of the individual and the specific co-
13 morbidity. (*combination of detailed recommendations on exercise across all comorbidities*).

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17 **Summary Recommendation 7: Cognitive rehabilitation interventions** (e.g. cognitive training, cognitive
18 stimulation, cognitive rehabilitation) may be recommended for older adults living with HIV with mild
19 cognitive impairment, and stroke. Inconclusive or insufficient evidence exists to support the use of **cognitive**
20 **behavioural therapy** with older adults with HIV with **depression**. While cognitive rehabilitation does not
21 appear harmful, weak evidence exists to support the use of cognitive-specific interventions to improve
22 spatial neglect, disability, memory, and functional status for older adults who experience stroke.
23 Rehabilitation professionals are encouraged to refer to specific clinical practice guidelines for each health
24 condition to determine the effects of different cognitive interventions for older adults with HIV living with
25 comorbidity. (*combination of detailed recommendations #29, 44, 46*)

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31 **Summary Recommendation 8:** In the absence of high level evidence on rehabilitation interventions for
32 older adults living with HIV and comorbidities, rehabilitation professionals should refer to **existing clinical**
33 **practice guidelines, systematic reviews, meta-analyses, and other forms of high level evidence for**
34 **recommendations on interventions for a specific comorbidity**. These recommendations should be applied
35 using an individualized approach incorporating the unique values, preferences, goals and needs of the
36 individual.
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Specific recommendations in rehabilitation for older adults living with HIV

Stream A - Recommendations Derived from Evidence Specific to Rehabilitation for Older Adults with HIV (HIV, Aging and Rehabilitation)

The following recommendations specific to HIV, rehabilitation and older adults serve as the contextual backdrop to providing rehabilitation care, treatment and support with older adults living with HIV.

We offer **16 recommendations** derived from evidence specific to rehabilitation for older adults with HIV combined with PLHIV and clinician values and preferences for clinicians to consider when working with older adults living with HIV. We include the level of evidence and citations from which each recommendation was derived. Some of the recommendations have additional explanatory notes to further explain the context and PLHIV and clinician values.

The recommendations are organized into the following six categories:

- A)** Preparedness of rehabilitation professionals;
- B)** Approaches to rehabilitation assessment and treatment of older adults living with HIV;
- C)** Extrinsic factors to consider with rehabilitation of older adults living with HIV;
- D)** Intrinsic factors to consider with rehabilitation of older adults living with HIV;
- E)** Rehabilitation approaches; and
- F)** Rehabilitation interventions.

Category
A

Preparedness of Rehabilitation Professionals

Recommendation 1: Rehabilitation professionals should be prepared to provide care to older adults with HIV who present with **complex comorbidities** affecting neurological, cardiorespiratory and musculoskeletal systems that may result in physical, mental and social health challenges.

Level of Evidence: Low

References

Grov C, Golub SA, Parsons JT, Brennan M & Karpiak SE. Loneliness and HIV-related stigma explain depression among older HIV-positive adults. *AIDS Care - Psychological and Socio-Medical Aspects of AIDS/HIV*. 2010; 22(5): 630-639.

Vance DE, Moneyham L, Fordham P & Struzick TC. A model of suicidal ideation in adults aging with HIV. *JANAC: Journal of the Association of Nurses in AIDS Care*. 2008; 19(5): 375-384.

Vance D E. Self-rated emotional health in adults with and without HIV. *Psychological Reports*. 2006; 98(1): 106-108.

Pitts M, Grierson J & Misson S. Growing older with HIV: a study of health, social and economic circumstances for people Living with HIV in Australia over the age of 50 years. *AIDS Patient Care & Stds*. 2005; 19(7): 460-465.

Heckman TG, Heckman BD, Kochman S, Sikkema KJ, Suhr J & Goodkin K. Psychological symptoms among persons 50 years of age and older living with HIV disease. *Aging & Mental Health*. 2002; 6(2): 121-128.

Heckman TG, Kochman A & Sikkema KJ. Depressive symptoms in older adults living with HIV disease: Application of the Chronic Illness Quality of Life Model. *Journal of Mental Health and Aging*. 2002; 8(4): 267-279.

Kalichman SC, Heckman T, Kochman A, Sikkema K & Bergholte J. Depression and thoughts of suicide among middle-aged and older persons living with HIV-AIDS. *Psychiatric Services*. 2000; 51(7): 903-907.

Heckman TG, Kochman A, Sikkema KJ & Kalichman SC. Depressive symptomatology, daily stressors, and ways of coping among middle-age and older adults living with HIV disease. *Journal of Mental Health and Aging*. 1999; 5(4): 311-322

Gutheil IA & Chichin ER. AIDS, older people, and social work. *Health & Social Work*. 1991; 16(4): 237-244.



**Category
B****Approaches to rehabilitation assessment and treatment of older adults with HIV**

Recommendation 2: Rehabilitation professionals should adopt an individualized approach to assessment and treatment of older adults living with HIV to fully understand the **unique and complex needs of older adults with HIV**. This approach should consider the intersections between **personal and social attributes** (race, gender, sexual orientation, ethnocultural background and socioeconomic status) and the **broader determinants of health** (housing, access to health care, poverty, racism, financial supports, income support, education, work and parenting roles).

Explanatory Notes: Rehabilitation professionals should consider the uniqueness of HIV care provision and the need to be flexible in their approach working with older adults with HIV.

Evidence provides information about how personal attributes of older adults living with HIV including age, sexual orientation, gender, race and comorbidities (or concurrent health conditions) may further increase the complexity of HIV and aging. Consideration of the broader determinants of health within the context of the complex personal attributes are required for considering the unique needs of older adults with HIV to enhance the rehabilitation process.

Level of Evidence: Low

References

Plach SK, Stevens PE & Keigher S. Self-care of women growing older with HIV and/or AIDS. *Western Journal of Nursing Research*. 2005; 27(5): 534-553.

Emler CA. HIV/AIDS and Aging: A Diverse Population of Vulnerable Older Adults. *Journal of Human Behavior in the Social Environment*. 2004; 9(4): 45-63.

Keigher SM, Stevens PE & Plach SK. Midlife women with HIV: health, social, and economic factors shaping their futures. *Journal of HIV/AIDS & Social Services*. 2004; 3(1): 43-58.

Emler CA & Farkas KJ. A descriptive analysis of older adults with HIV/AIDS in California. *Health & Social Work*. 2001; 26(4): 226-234.

Heckman TG, Kochman A, Sikkema KJ, Kalichman SC, Masten J & Goodkin K. Late middle-aged and older men living with HIV/AIDS: race differences in coping, social support, and psychological distress. *Journal of the National Medical Association*. 2000; 92(9): 436-444.

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B.1) Physical and Mental Health Assessment

Recommendation 3: Rehabilitation professionals should consider assessing a **diversity of physical and mental health outcomes during assessment**, which include but are not limited to, disability, quality of life, stress, coping, anxiety and depression, retirement and financial issues, sexual and familial relationships, loneliness and social networks, cognition, and daily function.

Level of Evidence: Very low

References

Senior K. Growing old with HIV. *The Lancet Infectious Diseases*. 2005; 5(12): 739.

B.2) Physical health (aerobic capacity)

Recommendation 4: Rehabilitation professionals should assess both **physical impairment and functional activity** with older adults living with HIV (such as limitations in aerobic capacity).

Level of Evidence: Very low

References

Oursler KK, Katzel LI, Smith BA, Scott WB, Russ DW & Sorkin JD. Prediction of cardiorespiratory fitness in older men infected with the human immunodeficiency virus: clinical factors and value of the six-minute walk distance. *Journal of the American Geriatrics Society*. 2009; 57(11): 2055-2061.

Oursler KK, Sorkin JD, Smith BA & Katzel LI. Reduced aerobic capacity and physical functioning in older HIV infected men. *AIDS Research & Human Retroviruses*. 2006; 22(11): 1113-1121.

B.3 - Mental Health

Recommendation 5: Rehabilitation professionals should incorporate **mental health assessment and treatment** into the care of older adults with HIV as they are at risk of experiencing low mood, anxiety, depression, and suicide ideation.

Explanatory Notes: Rehabilitation professionals need to be aware of stressors that impact overall health, quality of life, coping, the ability to carry out daily activities, and social inclusion. Mental health interventions that enhance the coping abilities of older adults with HIV, especially those with elevated levels of psychological distress, are urgently needed. Those who are aging with HIV may be particularly vulnerable to negative affect and emotional challenges of dealing with HIV.

Level of Evidence: Low



References

Grov C, Golub SA, Parsons JT, Brennan M & Karpiak SE. Loneliness and HIV-related stigma explain depression among older HIV-positive adults. *AIDS Care - Psychological and Socio-Medical Aspects of AIDS/HIV*. 2010; 22(5): 630-639.

Vance DE, Moneyham L, Fordham P & Struzick TC. A model of suicidal ideation in adults aging with HIV. *JANAC: Journal of the Association of Nurses in AIDS Care*. 2008; 19(5): 375-384.

Vance DE. Self-rated emotional health in adults with and without HIV. *Psychological Reports*. 2006; 98(1): 106-108.

Heckman TG, Kochman A & Sikkema KJ. Depressive symptoms in older adults living with HIV disease: Application of the Chronic Illness Quality of Life Model. *Journal of Mental Health and Aging*. 2002; 8(4): 267-279.

Heckman TG, Heckman BD, Kochman A, Sikkema KJ, Suhr J & Goodkin K. Psychological symptoms among persons 50 years of age and older living with HIV disease. *Aging & Mental Health*. 2002; 6(2): 121-128.

Kalichman SC, Heckman T, Kochman A, Sikkema K & Bergholte J. Depression and thoughts of suicide among middle-aged and older persons living with HIV-AIDS. *Psychiatric Services*. 2000; 51(7): 903-907.

Heckman TG, Kochman A, Sikkema KJ & Kalichman SC. Depressive symptomatology, daily stressors, and ways of coping among middle-age and older adults living with HIV disease. *Journal of Mental Health and Aging*. 1999; 5(4): 311-322.

B.4 - Neurocognitive Screening

Recommendation 6: Rehabilitation professionals should conduct regular **neurocognitive screening** with older adults living with HIV, and where indicated, conduct complete assessments to identify early signs of HIV-associated executive functioning deficits (e.g. ability to keep appointments, adhere to medication regimens, and follow-up on recommendations) and interventions to effectively prevent, reduce or compensate for cognitive impairments.

Explanatory Notes: Early and ongoing assessment of neurocognition among older adults living with HIV may promote early rehabilitation interventions helpful for improving cognitive function or preventing further deterioration. However, weak evidence exists for suggesting optimal methods to assess mild to moderate neurocognitive impairment and the optimal rehabilitation interventions that may address these impairments specifically to older adults living with HIV.

Level of Evidence: Low

References

Vance DE & Struzick TC. Addressing risk factors of cognitive impairment in adults aging with HIV: a social work model. *Journal of Gerontological Social Work*. 2007; 49(4): 51-77.

Vance DE & Burrage Jr JW. Promoting successful cognitive aging in adults with HIV: Strategies for intervention. *Journal of Gerontological Nursing*. 2006; 32(11):34-41.

Vance DE & Burrage Jr JW. Cognitive complaints in adults aging with HIV: a pilot study. *Physical & Occupational Therapy in Geriatrics*. 2005; 24(2): 35-51.

Neundorfer MM, Camp CJ, Lee MM, Skrajner MJ, Malone ML & Carr JR. Compensating for cognitive deficits in persons aged 50 and over with HIV/AIDS, *Journal of HIV/AIDS & Social Services*. 2004; 3(1): 79-97.

Lee MM & Camp CJ. Clinical comments. Spaced retrieval: a memory intervention for HIV+ older adults. *Clinical Gerontologist*. 2001; 22(3/4): 131-135.

B.5) Uncertainty

Recommendation 7: Rehabilitation professionals should be aware of the potential impact of **uncertainty** among older adults with HIV and the psychological importance for some older adults to know the source of their symptoms (age-related versus HIV-related versus medication-related).

Level of Evidence: Low

References

Siegel K, Dean L & Schrimshaw EW. Symptom ambiguity among late-middle-aged and older adults with HIV. *Research on Aging*. 1999; 21(4): 595-618.

B.6) Social Inclusion

Recommendation 8: Rehabilitation professionals should consider the risk of **social exclusion** older adults with HIV may face in relation to race, ethnicity, gender, and sexual orientation, in addition to their HIV status, in their assessment.

Explanatory Notes: Older adults living with HIV are at risk of social exclusion, dependent on personal and environmental factors.

Level of Evidence: Low

References

Emler CA. An examination of the social networks and social isolation in older and younger adults living with HIV/AIDS. *Health & Social Work*. 2006; 31(4): 299-308.



Category C

Extrinsic Factors to consider with rehabilitation of older adults living with HIV

C.1) Ageism and Stigma

Recommendation 9: Rehabilitation professionals should be knowledgeable of **ageism** as an added layer of stigma that may increase existing HIV stigma and homophobia experienced by older adults with HIV.

Level of Evidence: Low

References

Older HIV patients deal with the double stigma of having the disease and being old. Big worry: 'Will I get to see grandkids if I tell?'. AIDS Alert. 2007; 22(2): 16-17.

Poindexter CC. Six champions speak about being over 50 and living with HIV. Journal of HIV/AIDS & Social Services. 2004; 3(1): 99-117.

C.2) HIV Disclosure

Recommendation 10: Rehabilitation professionals should understand the implications of **HIV disclosure** among older adults with HIV, be respectful of individualized choice surrounding disclosure, the potential social, legal and financial implications of disclosure, and be prepared to discuss ways to ensure clients obtain the necessary supports surrounding disclosure.

Explanatory Notes: Issues surrounding disclosure will be increasingly important as older adults with HIV enter long term care environments with increasing complexities with stigma having implications for disclosure.

Level of Evidence: Low

References

Poindexter C & Shippy RA. Networks of older New Yorkers with HIV: fragility, resilience, and transformation. AIDS Patient Care & Stds. 2008; 22(9): 723-733.

Shippy RA. Taking care of each other. GMHC treatment issues : the Gay Men's Health Crisis newsletter of experimental AIDS therapies. 2007; 21(2): 7-8.

Schrimshaw EW & Siegel K. Perceived barriers to social support from family and friends among older adults with HIV/AIDS. Journal of Health Psychology. 2003; 8(6): 738-752.

C.3) Social Support

Recommendation 11a: Rehabilitation professionals should be knowledgeable about the importance of social relationships and the need for **emotional and practical social support** to maximize physical, mental and psychological well-being for older adults with HIV.

Recommendation 11b: Rehabilitation professionals should recognize the **emotional and practical barriers to social support** that may exist within 'family' and 'support networks' among older adults with HIV.

Recommendation 11c: Rehabilitation professionals should recognize the **supportive obligations** that older adults with HIV may have to family, friends and fellow people with HIV and how this might impact their overall health.

Explanatory Notes: There may be a variable composition of 'family' and 'support networks' among older adults with HIV as HIV positive older adults may form essential networks with others living with HIV for support and grief. These networks may be simultaneously vulnerable and durable.

Level of Evidence: Low

References

Mavandadi S, Zanjani F, Ten Have TR & Oslin DW. Psychological well-being among individuals aging with HIV: the value of social relationships. *Journal of Acquired Immune Deficiency Syndromes: JAIDS*. 2009; 51(1): 91-98.

Poindexter C & Shippy RA. Networks of older New Yorkers with HIV: fragility, resilience, and transformation. *AIDS Patient Care & Stds*. 2008; 22(9): 723-733.

Shippy RA. Taking care of each other. *GMHC treatment issues : the Gay Men's Health Crisis newsletter of experimental AIDS therapies*. 2007; 21(2): 7-8.

Shippy R & Karpiak SE. Perceptions of Support Among Older Adults With HIV. *Research on Aging*. 2005; 27(3): 290-306.

Chesney MA, Chambers DB, Taylor JM & Johnson LM. Social support, distress, and well-being in older men living with HIV infection. *Journal of Acquired Immune Deficiency Syndromes: JAIDS*. 2003; 33 Suppl 2: S185-193.

Schrimshaw EW & Siegel K. Perceived barriers to social support from family and friends among older adults with HIV/AIDS. *Journal of Health Psychology*. 2003; 8(6): 738-752.

Malone MA. HIV-positive women over fifty: how they cope. *AIDS Patient Care & Stds*. 1998; 12(8): 639-643.

Category D

Intrinsic Factors to consider with rehabilitation of older adults living with HIV

D.1) Self-Management

Recommendation 12: Rehabilitation professionals should consider the role of **self-management strategies** to promote health and wellness among older adults living with HIV.

Level of Evidence: Low

References

Plach SK, Stevens PE & Sharon K. Self-care of women growing older with HIV and/or AIDS. *Western Journal of Nursing Research*. 2005; 27(5): 534-553.

Heckman TG, Kochman A, Sikkema KJ, Kalichman SC, Masten J & Goodkin K. Late middle-aged and older men living with HIV/AIDS: race differences in coping, social support, and psychological distress. *Journal of the National Medical Association*. 2000; 92(9): 436-444.

D.2) Spirituality

Recommendation 13: Rehabilitation professionals may consider the importance and role of **spirituality** in the health of older adults with HIV depending on the individual.

Explanatory Notes: The importance of spirituality among older adults living with HIV care may vary based on religious and ethnocultural background and may be complex, balanced with potential benefits of social support and challenges to social inclusion.

Level of Evidence: Very low

References

Hines ME. Commentary on "biopsychosocial benefits of spirituality in adults aging with HIV: implications for nursing practice and research". *New challenges for providing spiritual care in aging patients with HIV*. *Journal of Holistic Nursing*. 2008; 26(2): 126-127.

Ackerman, M. Religiosity and Biopsychosocial Outcomes in HIV: A SEM Comparison of Gender, Race, and Sexual Orientation. *Southern Online Journal of Nursing Research*. 2008; 8(4) at: [http://www.resourcenter.net/images/snrs/files/sojnr_articles2/Vol08Num04A.html#Ackerman.\(2008\).](http://www.resourcenter.net/images/snrs/files/sojnr_articles2/Vol08Num04A.html#Ackerman.(2008).) "2008 SNRS abstracts -- A." *Southern Online Journal of Nursing Research* 8(4): 1-1.

Vance DE & Woodley RA Strengths and distress in adults who are aging with HIV: a pilot study. *Psychological Reports*. 2005; 96(2): 383-386.

Vance DE & Robinson FP. Reconciling successful aging with HIV: a biopsychosocial overview. *Journal of HIV/AIDS & Social Services*. 2004; 3(1): 59-78.

Category
E

Rehabilitation Approaches

E.1) Interprofessional Practice

Recommendation 14: Rehabilitation professionals should use an **interprofessional approach to practice** that is **sensitive** to the unique and individualized values and preferences of older adults with HIV while considering issues of culture, stigma and discrimination. Specifically rehabilitation professionals should **communicate** information surrounding care, treatment and education in a way that is **tailored to the specific needs** of older adults with HIV to optimize physical and mental health and well-being.

Level of Evidence: Low to very low

References

Shippy RA & Karpiak SE. The aging HIV/AIDS population: fragile social networks. *Aging & Mental Health*. 2005; 9(3): 246-254.

Hillman JL & Stricker G. Some issues in the assessment of HIV among older adult patients. *Psychotherapy*. 1998; 35 (4): 483-489.

E.2) Complementary and Alternative Medicine

Recommendation 15: Rehabilitation professionals should inquire about the nature and extent to which older adults with HIV use **complementary and alternative medicine (CAM)** and consider the potential benefits and side effects of CAM interventions.

Explanatory Notes; Lifestyle strategies might include use of complementary and alternative medicines and therapies. Given the high number of older adults with HIV taking complementary and alternative medicine (CAM) in combination or in lieu of antiretrovirals, it is important for rehabilitation professionals to consider the use of CAM among older adults living with HIV.

Level of Evidence: Low

References

Wutoh AK, Brown CM, Kumoji EK, Daftary MS, Jones T, Barnes NA & Powell NJ. Antiretroviral adherence and use of alternative therapies among older HIV-infected adults. *Journal of the National Medical Association*. 2001; 93(7-8): 243-250.



Category F

Rehabilitation Interventions

Recommendation 16: Exercise (specifically progressive resistive exercise) may be recommended for associated improvements in strength, body composition, and physical fitness in older adults living with HIV. Specifically, resistive exercise may be considered for use among older adults who are frail to increase muscle strength and mitigate wasting.

Explanatory Notes: A paucity of rehabilitation intervention evidence existed specific to older adults living with HIV. Exercise was one intervention where although there was low level evidence comprised of a prospective single group study design, this recommendation was highly GRADED by the synthesis team. Evidence on neurocognitive interventions such as space retrieval and teleconferencing support interventions also existed suggesting that group cognitive interventions focused on increasing adaptive coping and social support may help to improve the health-related quality of life of older adults living with HIV and that teleconferencing support or coping group interventions may help to improve psychological well-being, however these too were low levels of evidence and these interventions were not highly GRADED by the synthesis team. Concerns were raised in highlighting these interventions over other interventions used in clinical practice only because there was some form of evidence published in this area. As a result, we refrained from developing specific recommendations for rehabilitation interventions that did not have evidence and were not strongly graded by the team.

Level of Evidence: Low

References

de Souza PML, Filho WJ, Santarem JM, da Silva AR, Li HY & Burattini MN. Progressive resistance training on elderly HIV+ patients: Does it work? *American Journal of Infectious Diseases*. 2008; 4(4): 215-219.

Evans WJ, Roubenoff R & Shevitz A. Exercise and the treatment of wasting: aging and human immunodeficiency virus infection. *Seminars in Oncology*. 1998; 25(2 Suppl 6): 112-122.

Additional References (interventions not included in the specific recommendations)

Heckman TG, Barcikowski R, Ogles B, Suhr J, Carlson B, Holroyd K & Garske J. A Telephone-Delivered Coping Improvement Group Intervention for Middle-Aged and Older Adults Living With HIV/AIDS. *Annals of Behavioral Medicine*. 2006; 32(1): 27-38.

Nokes KM, Chew L & Altman C. Using a telephone support group for HIV-positive persons aged 50+ to increase social support and health-related knowledge. *AIDS Patient Care & Stds*. 2003; 17(7): 345-351.

Heckman TG, Kochman A, Sikkema KJ, Kalichman SC, Masten J, Bergholte J & Catz S. A pilot coping improvement intervention for late middle-aged and older adults living with HIV/AIDS in the USA. *AIDS Care*. 2001; 13(1): 129-139.

Lee MM & Camp CJ. Clinical comments. Spaced retrieval: a memory intervention for HIV+ older adults. *Clinical Gerontologist*. 2001; 22(3/4): 131-135.

Specific recommendations in rehabilitation for older adults living with HIV

Stream B- Recommendations for Rehabilitation Interventions for Older Adults with HIV who may experience Common Comorbidities

The following recommendations serve as a guide for rehabilitation interventions with older adults living with HIV who may be living with common comorbidities. No guidelines exist on rehabilitation interventions specific to older adults with HIV and comorbidities. While high level evidence exists for exercise and HIV, these systematic reviews were not specifically focused with older adults with HIV.

For Stream B, we included systematic reviews or meta-analyses so the rating of the evidence was either high (systematic reviews published in the Cochrane Library) or moderate (other systematic reviews or meta-analyses not published in the Cochrane Library). However, the wording of our recommendation depended on how well or to what extent we could make the leap from the condition-specific evidence to a recommendation for rehabilitation specific to older adults living with HIV and these conditions. Hence, PLHIV and clinician values and preferences were integral to determining the strength of the recommendation, based on whether the recommendation made sense clinically and experientially for older adults living with HIV and that the intervention posed minimal risk or harm to older adults living with HIV.

We offer **36 recommendations** that include specific considerations when applying rehabilitation interventions for adults living with HIV. We then indicate the level of evidence and citations of evidence (references) from which the recommendations were derived. Given this synthesis was not specific to older adults, we also provide the age of participants represented in the evidence, to help clinicians determine the applicability of the recommendation to older adults with HIV.

The recommendations are presented based on interventions across 10 categories specific to:

- A)** Older adults;
- B)** HIV/AIDS, and eight comorbidities that may be experienced by older adults with HIV;
- C)** Bone and joint disorders;
- D)** Cancer;
- E)** Stroke;
- F)** Cardiovascular disease;
- G)** Mental health challenges;
- H)** Cognitive impairments;
- I)** Chronic Obstructive Pulmonary Disease (COPD); and
- J)** Diabetes.

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For each comorbidity, we provide a background on the prevalence and incidence of the condition among people living with HIV, and the nature of disability that may be experienced by adults living with HIV and these comorbidities.

For peer review only



Category

A

Older Adults Living with HIV

The prevalence of older adults with HIV in Canada and the United States is increasing. As of 2008, approximately 10% of Canadians living with HIV were older adults (50 years or older). In Canada, the rate of new HIV positive reports for older adults increased from 11% in 1999 to 15% in 2008 (1).

In 2005, the prevalence of older adults living with HIV, 50 years and older in the United States was 24%. Older adults accounted for 15% of all new HIV cases in 2005 (2)

Among Canadians living with HIV 50 years and older in 2005, the majority was men (86%), white (74%), 13% were Aboriginal and 6% were of African descent (1). Newly reported HIV positive cases for women ages 50 years and older increased from 11% between 1985-1996 to approximately 16% between 1997- 2008 (1).

Among adults living with HIV, 50 years and older, 18% reported having one comorbidity, 28% reported having two, and 54% reported having three or more (3). Over 50% of older adults living with HIV reported taking antiretroviral therapy (3). Long-term antiretroviral therapy may be associated with several metabolic and anatomic complications, including abnormal or degenerative conditions of the body’s adipose tissue (lipodystrophy), insulin resistance, diabetes, kidney disease and an abnormal amount of lipids in the blood (dyslipidemia) (3-6).

Disability Experienced by Older Adults with HIV

Challenges faced by adults living with HIV, 50 years and over may include low bone mass density (which increases the risk of osteoporotic fractures), fatigue, weight loss, night sweats and diminished appetite (4, 7-10). Comorbidities such as cardiovascular disease, osteoporosis, decline of renal function, liver disease and dementia are more common among older adults living with HIV and can complicate the disease process and management (4, 11, 12).

We present three recommendations for exercise and occupational therapy for older adults living with HIV.



A.1 – Exercise

Recommendation 17: Regular forms of exercise including (strength/resistance training, aerobic/cardiovascular endurance training, and balance/stability training) may be strongly recommended for older adults with HIV who are medically stable to reduce fall rates, improve functional and physical performance, improve cardiopulmonary fitness, reduce depressive symptoms, and improve mood and quality of life.

Specifically:

Recommendation 17a: Exercise-specific interventions involving **gait, balance, co-ordination and functional exercises, and muscle strengthening** is strongly recommended for its beneficial effect on balance.

Recommendation 17b: Aerobic exercise is strongly recommended to improve cardiorespiratory fitness and may also be beneficial for cognitive function specifically improvements in motor function, cognitive speed, auditory and visual attention.

Recommendation 17c: Progressive resistive exercise two to three times a week may be recommended to improve physical function. Clients should be monitored as evidence suggests adverse effects might occur in older people at higher risk of injury (i.e. frail or recently ill older people).

Recommendation 17d: Home-based exercise programs may be recommended for those who are medically stable as evidence suggests home-based exercise may be just as beneficial to centre-based exercise (rehabilitation) programs.

Level of Evidence: High (combination of Cochrane systematic reviews and meta-analyses - not Cochrane)

Age of Participants in Research Evidence: >50 years (and >60 years in majority of evidence)

References

Liu CJ & Latham NK. Progressive resistance strength training for improving physical function in older adults. *Cochrane Database of Systematic Reviews* 2009, Issue 3. Art. No.: CD002759. DOI: 10.1002/14651858.CD002759.pub2.

Angevaren M, Aufdemkampe G, Verhaar HJJ, Aleman A & Vanhees L. Physical activity and enhanced fitness to improve cognitive function in older people without known cognitive impairment. *Cochrane Database of Systematic Reviews* 2008, Issue 3. Art. No.: CD005381. DOI: 10.1002/14651858.CD005381.pub3.

Gu MO & Conn VS. Meta-analysis of the effects of exercise interventions on functional status in older adults. *Research in Nursing & Health*. 2008; 31(6): 594–603 [Published online 10 June 2008 in Wiley InterScience]. DOI: 10.1002/nur.20290.

Baker MK, Atlantis E & Fiatarone Singh MA. Multi-modal exercise programs for older adults: systematic review. *Age and Ageing*. 2007; 36(4): 375–381. DOI:10.1093/ageing/afm054.

de Morton N, Keating JL & Jeffs K. Exercise for acutely hospitalised older medical patients. *Cochrane Database of Systematic Reviews* 2007, Issue 1. Art. No.: CD005955. DOI: 10.1002/14651858.CD005955.pub2.

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3 Howe TE, Rochester L, Jackson A, Banks PMH & Blair VA. Exercise for improving balance in older people.
4 *Cochrane Database of Systematic Reviews* 2007, Issue 4. Art. No.: CD004963. DOI:
5 10.1002/14651858.CD004963.pub2.
6

7
8 Sjosten N & Kivela SL. The effects of physical exercise on depressive symptoms among the aged: a
9 systematic review. *International Journal of Geriatric Psychiatry*. 2006; 21(5): 410-418.
10

11 Ashworth NL, Chad KE, Harrison EL, Reeder BA & Marshall SC. Home versus center based physical activity
12 programs in older adults. *Cochrane Database of Systematic Reviews* 2005, Issue 1. Art.No.: CD004017. DOI:
13 10.1002/14651858.CD004017.pub2.
14

15 Huang G, Gibson CA, Tran ZV & Osness WH. Controlled endurance exercise training and VO2max changes in
16 older adults: a meta-analysis. *Preventive Cardiology*. 2005; 8(4): 217-225.
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19 Arent SM, Landers DM & Etnier JL. The effects of exercise on mood in older adults: a meta-analytic review.
20 *Journal of Aging and Physical Activity*. 2000; 8(4):407-430.
21

22 A.2 – Rehabilitation

23
24 **Recommendation 18: Multidisciplinary forms of rehabilitation is strongly recommended**
25 **for older adults with HIV who are hospitalized to promote earlier discharge directly home**
26 **from hospital and reduced costs associated with hospitalization.**
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30 **Level of Evidence:** High (combination of Cochrane systematic reviews and meta-analyses - not Cochrane)
31

32 **Age of Participants in Research Evidence:** >50 years (and >60 years in majority of evidence)
33

34 References

35 Liu CJ & Latham NK. Progressive resistance strength training for improving physical function in older adults.
36 *Cochrane Database of Systematic Reviews* 2009, Issue 3. Art. No.: CD002759. DOI:
37 10.1002/14651858.CD002759.pub2.
38

39 Angevaren M, Aufdemkampe G, Verhaar HJJ, Aleman A & Vanhees L. Physical activity and enhanced fitness
40 to improve cognitive function in older people without known cognitive impairment. *Cochrane Database of*
41 *Systematic Reviews* 2008, Issue 3. Art. No.: CD005381. DOI: 10.1002/14651858.CD005381.pub3.
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43 Gu MO & Conn VS. Meta-analysis of the effects of exercise interventions on functional status in older
44 adults. *Research in Nursing & Health*, 2008, 31, 594–603. Published online 10 June 2008 in Wiley
45 InterScience. DOI: 10.1002/nur.20290.
46

47 Baker MK, Atlantis E & Fiatarone Singh MA. Multi-modal exercise programs for older adults: systematic
48 review. *Age and Ageing* 2007; 36: 375–381. doi:10.1093/ageing/afm054.
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50 de Morton N, Keating JL & Jeffs K. Exercise for acutely hospitalised older medical patients. *Cochrane*
51 *Database of Systematic Reviews* 2007, Issue 1. Art. No.: CD005955. DOI:
52 10.1002/14651858.CD005955.pub2.
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3 Howe TE, Rochester L, Jackson A, Banks PMH & Blair VA. Exercise for improving balance in older people.
4 *Cochrane Database of Systematic Reviews* 2007, Issue 4. Art. No.: CD004963. DOI:
5 10.1002/14651858.CD004963.pub2.
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8 Sjosten N & Kivela SL. The effects of physical exercise on depressive symptoms among the aged: a
9 systematic review. *International Journal of Geriatric Psychiatry*. 2006; 21(5): 410-418.

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11 Ashworth NL, Chad KE, Harrison EL, Reeder BA & Marshall SC. Home versus center based physical activity
12 programs in older adults. *Cochrane Database of Systematic Reviews* 2005, Issue 1. Art.No.: CD004017. DOI:
13 10.1002/14651858.CD004017.pub2.
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16 Huang G, Gibson CA, Tran ZV & Osness WH. Controlled endurance exercise training and VO2max changes in
17 older adults: a meta-analysis. *Preventive Cardiology*. 2005; 8(4): 217-225.
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20 Arent S M, Landers D M & Etnier J L. The effects of exercise on mood in older adults: a meta-analytic
21 review. *Journal of Aging and Physical Activity*. 2000; 8:407-430.
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23 A.3 – Occupational Therapy

24
25 **Recommendation 19: Occupational therapy** may be an important component of
26 rehabilitation for older adults living with HIV with functional impairments and is strongly
27 recommended for elderly community dwellers, specifically for advising on adaptive
28 devices; mobility devices; energy conservation; cognitive training; training of skills to use
29 adaptive devices to enhance functional ability, and to enhance social participation and
30 quality of life.
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33 **Level of Evidence:** Moderate (systematic review but not Cochrane)

34
35 **Age of Participants in Research Evidence:** >60 years
36

37 Reference

38
39 Steultjens EM, Dekker J, Bouter LM, Jellema S, Bakker EB & van den Ende CH. Occupational therapy for
40 community dwelling elderly people: a systematic review. *Age & Ageing*. 2004; 33(5): 453-460.
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Category
B

HIV/AIDS

We present one recommendation for exercise specific to older adults living with HIV.

Recommendation 20: Aerobic and resistive exercise may be recommended for at least 20 minutes at least 3 times per week for at least 5 weeks for older adults living with HIV who are medically stable with the potential to maintain or enhance outcomes of cardiopulmonary fitness, weight and body composition, strength, and quality of life.

Explanatory Notes: Although this recommendation was derived from high level evidence on HIV and exercise, the evidence is not specific to older adults with HIV. Clinicians are encouraged to use this recommendation in combination with the exercise recommendation #16 that was derived from lower level evidence, but specifically to older adults with HIV.

Level of Evidence: High (Cochrane systematic reviews)

Age of Participants in Research Evidence: Age range 18-66 years

References

O'Brien K, Nixon S, Tynan AM & Glazier R. Aerobic exercise interventions for adults living with HIV/AIDS. *Cochrane Database of Systematic Reviews* 2010, Issue 8. Art. No.: CD001796. DOI: 10.1002/14651858.CD001796.pub3.

O'Brien K, Tynan AM, Nixon S & Glazier RH. Effects of progressive resistive exercise in adults living with HIV/AIDS: systematic review and meta-analysis of randomized trials. *AIDS Care*. 2008; 20(6): 631-653. Available from: <http://dx.doi.org/10.1080/09540120701661708>.



Category
C**Bone and Joint Disorders**

The prevalence of low bone mineral density (BMD) among older adults living with HIV ranges from 27%-39%; and the prevalence of osteoporosis is 15% - 16% which is 4 times greater than adults without HIV. Prevalence rates for osteopenia are 20-52% and 4% for osteonecrosis (7, 13-16).

HIV infection has been independently linked to decreased BMD among men and women (10, 13). Men ages 50 years and older in general have low BMD, but this levels of BMD are lower among older men living with HIV compared to men in the same age group living without HIV (10). The prevalence of low peak bone mass are higher among women living with HIV compared to women who are not living with HIV, younger in age, have a moderate to high body weight, no history of bone fractures and who has or is currently using estrogen (13).

Lifestyle factors among people living with HIV associated with low peak bone mass include cigarette smoking (10, 17). With an increasing prevalence of smoking among people living with HIV, the prevalence of osteoporosis may increase among this population (4, 18).

Ethnicity is a genetic factor strongly associated with BMD (13). People of African descent have higher BMD and a lower risk of developing osteoporosis compared to the rest of the population, but the presence of an HIV infection can reduce BMD and increase risk of osteoporotic fractures regardless of ethnicity (13).

Rheumatic Disorders are medical problems affecting the joints and connective tissue (19). They include spondyloarthropathic arthritis, also known as Reiter's syndrome which has a prevalence rate ranging from 5-10% among adults with HIV (19). The prevalence rate for psoriatic arthritis is 1-32% among adults living with HIV (19).

Disability Experienced by Adults with Bone and Joint Disorders

Challenges faced by adults living with HIV with bone and joint disorders include prolonged periods of immobility (decreased activity levels), increased bone loss, reduced weight bearing, decreased joint range-of-motion, and pain in joints and areas closest to joint (13, 16, 19).

Low BMD in the femoral neck and lumbar spine increases the risk of osteoporotic fractures for women living with HIV (13). Older men living with HIV with low BMD have increased chances of fractures and hospitalization from fracture (7, 10). Fractures can lead to activity limitations (such as decreased mobility) as well as social participation restrictions.

We present four recommendations for exercise, rehabilitation and self-management interventions for older adults living with HIV and bone and joint disorders.

C.1 – Exercise

Recommendation 21a: Supervised exercise sessions should be recommended to older adults living with HIV with knee and/or hip osteoarthritis (OA) who are medically stable to improve pain and physical function.

Explanatory Notes: Evidence more strongly suggests improvements with knee osteoarthritis (OA) rather than hip OA. Exercise programs that involve more than 12 directly supervised sessions may be associated with greater improvements in knee pain and physical function. While this evidence was not specific to older adults with knee or hip OA, it did include older adults with OA in the systematic review.

Recommendation 21b: A combination of low impact exercise in the form of jogging, stair climbing and walking, combined with high-magnitude resistance training should be recommended for older adults with HIV to preserve bone mineral density.

Explanatory Notes: Evidence is specific to postmenopausal women, but there is no reason that men may not benefit from these exercise interventions as well.

Level of Evidence: High (knee OA) to moderate (hip OA) (systematic review but not Cochrane)

Age of Participants in Research Evidence: >50 years

References

Fransen M & McConnell S. Exercise for osteoarthritis of the knee. Cochrane Database of Systematic Reviews 2008, Issue 4. Art. No.: CD004376. DOI: 10.1002/14651858.CD004376.pub2. Available from: <http://onlinelibrary.wiley.com/doi/10.1002/14651858.CD004376.pub2/pdf>

Fransen M & McConnell S, Hernandez-Molina G, Reichenbach S. Exercise for osteoarthritis of the hip. *Cochrane Database of Systematic Reviews* 2009, Issue 3. Art. No.: CD007912. DOI: 10.1002/14651858.CD007912. Available from: <http://onlinelibrary.wiley.com/doi/10.1002/14651858.CD007912/full>

Martyn-St James M & Carroll S. A meta-analysis of impact exercise on postmenopausal bone loss: The case for mixed loading exercise programmes. *Br J Sports Med.* 2009; 43(12): 898-908. Originally published online November 3, 2008. DOI: 10.1136/bjsm.2008.052704. Available from: <http://bjsportmed.com/content/43/12/898.abstract>.

Recommendation 22: Balance and strengthening exercises should be part of an overall exercise program to decrease falls and risk of fall-related fractures for older adults with HIV and low bone mineral density (BMD).

Explanatory Notes: Balance and strengthening exercises are important for overall aging and older adults but particularly for older adults with HIV who may have nutritional challenges and issues with muscle-wasting. Balance training is also particularly important for older adults with HIV who may have peripheral neuropathy resulting in balance impairments placing them at increased risk for falls.



1
2 **Level of Evidence:** Moderate (systematic review but not Cochrane)

3
4 **Age of Participants in Research Evidence:** >50 years

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6
7 **References**

8 de Kam D, Smulders E, Weerdesteyn V & Smits-Engelsman BC. Exercise interventions to reduce fall-related
9 fractures and their risk factors in individuals with low bone density: a systematic review of randomized
10 controlled trials. *Osteoporosis International*. 2009; 20(12): 2111-212. DOI: 10.1007/s00198-009-0938-6.

11
12
13 **C.2 - Rehabilitation**

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15 **Recommendation 23: Multidisciplinary rehabilitation teams** comprised of an
16 occupational therapy (OT) and physical therapy (PT) across the **continuum of care** should
17 be recommended for older adults with HIV who sustain a hip fracture. Specifically,
18 **inpatient geriatric rehabilitation programs** are strongly recommended and may be an
19 ideal intervention as they have the potential to reduce nursing home admission, mortality
20 and improve functional status.
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22

23 **Explanatory Notes:** Weak evidence exists on the effect of rehabilitation interventions for older adults post
24 hip fracture on physical, psychosocial outcomes, mortality and length of stay. Limitations in the evidence
25 are related to the large variability in interventions and outcomes assessed.
26

27
28 **Level of Evidence:** Moderate (systematic review but not Cochrane)

29
30 **Age of Participants in Research Evidence:** >50 years

31
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C.3 – Self-Management Programs

Recommendation 24: Self-management programs may be considered as a component of a rehabilitation program to address disability and pain for older adults living with HIV and arthritis.

Explanatory Notes: Self-management strategies may be particularly useful in the context of HIV whereby there may be limitations in access to rehabilitation services for older adults with HIV.

Level of Evidence: Moderate (systematic review but not Cochrane)

Age of Participants in Research Evidence: Mean age 61 years

Reference

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Category

D

Cancer

Since the introduction of combination antiretroviral therapy the incidence of AIDS associated cancers such as Kaposi's sarcoma (KS) and Non-Hodgkin's Lymphoma (NHL) have declined (20).

However, incidence rates of non-AIDS associated cancers among adults living with HIV have increased, including anal cancer (43%), vaginal cancer (21%), and cervical cancer (19%) Hodgkin Lymphoma (15%), liver cancer (8%), lung cancer (3%), and melanoma cancers (3%) (20, 21). The pattern of breast cancer in adults living with HIV is unusual, as only a few cases have been reported (22, 23). Breast cancer is the most common form of cancer among women in the general population. While no increased incidence of breast cancer in women living with HIV has been identified, this form of cancer is becoming an increasingly important comorbidity for women living with HIV (22, 24).

Current evidence suggests low rates of screening for non-AIDS associated cancers among people living with HIV (24, 25).

Disability Experienced by Adults living with Cancer

Non-AIDS associated cancers can cause fatigue, weight loss, night sweats and diminished appetite (9). Symptoms of Non AIDS-associated cancers are often similar to symptoms of HIV/AIDS (25).

We present five recommendations pertaining to exercise for older adults living with HIV and general, lung, breast or metastatic cancer.

Di) - Cancer (General)

Di-1 – Exercise

Recommendation 25: A combination of aerobic and resistance exercise at moderate intensity may be recommended for older adults living with HIV and cancer to reduce cancer-related fatigue during and after treatment for cancer. Any exercise intervention should be individualized based on the targeted health outcome and cancer type.

Level of Evidence: High (Cochrane systematic review)

Age of Participants in Research Evidence: Mean age majority >50 years

References

Brown J, Huedo-Medina TB, Pescatello LS, Pescatello SM, Ferrer RA & Johnson BT. Efficacy of Exercise Interventions in Modulating Cancer-Related Fatigue among Adult Cancer Survivors: A Meta-Analysis. *Cancer Epidemiol Biomarkers Prev.* 2011; 20:123-133. DOI:10.1158/1055-9965.EPI-10-0988.

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10

11 **Recommendation 26: A combination of aerobic and resistive exercise** at least twice a
12 week for at least 2 weeks at 50-90% maximum oxygen capacity (VO₂max) intensity is safe
13 and may be recommended for older adults living with cancer for improvements in
14 physiological measures, symptoms, physical and psychosocial functioning of patients and
15 health-related quality of life. Positive effects of exercise may vary as a function of the type
16 of cancer; the stage of disease; the medical treatment; the nature, intensity, and duration
17 of the exercise program; and the lifestyle of the individual.
18
19
20

21
22 **Level of Evidence:** Moderate (systematic review but not Cochrane)
23

24 **Age of Participants in Research Evidence:** Age ranged 16-71 years
25

26
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31 Knols R, Aaronson NK, Uebelhart D, Fransen J & Aufdemkampe D. Physical Exercise in Cancer Patients
32 During and After Medical Treatment: A Systematic Review of Randomized and Controlled Clinical Trials. J
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34

35
36 **Dii) Lung Cancer**
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39 **Dii-1- Exercise**
40

41 **Recommendation 27: Exercise** may be beneficial for self-empowerment and should be
42 recommended for older adults living with HIV who are also living with **lung cancer** who are
43 medically stable.
44

45
46 **Explanatory Notes:** Weak evidence exists on the effect of exercise among adults with lung cancer. Given
47 the increasing prevalence of lung cancer as a non-AIDS related cancer for people living with HIV, the role for
48 exercise may be particularly important with respect to this recommendation. Furthermore, rehabilitation
49 professionals may want to consider their role in addressing smoking cessation among their clients living
50 with HIV.
51

52
53 **Level of Evidence:** High (Cochrane systematic review)
54



1
2 **Age of Participants in Research Evidence:** Mean age >50 years
3

4 **Reference**

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7 Reviews 2004, Issue 4. Art. No.: CD004282. DOI: 10.1002/14651858.CD004282.pub2.
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10 **Diii) Breast Cancer**

11 **Diii-1- Exercise**

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14 **Recommendation 28a: Supervised aerobic exercise programs should be included during**
15 **breast cancer** treatment for the management of cancer related fatigue for older women
16 living with HIV and breast cancer who are medically stable.

17 **Recommendation 28b: A combination of aerobic and resistive exercise** at least 3 times
18 per week for at least 6 weeks, 30-40 minutes per session, at moderate intensity (e.g. rate
19 of perceived exertion 11-13 out of 20) appears to be safe and may be recommended for
20 older women living with HIV undergoing or who have undergone treatment for **breast**
21 **cancer** and who are medically stable for potential improvements in cardiopulmonary
22 fitness, physical functioning, fatigue, and body composition and quality of life.
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28 **Level of Evidence** - High (Cochrane systematic review)
29

30 **Age of Participants in Research Evidence:** Mean age majority >50 years
31

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For peer review only



Category E

Stroke

The prevalence of stroke among adults living with HIV between 2000 and 2006 is 11%; these rates are much higher among older women living with HIV (14%) compared to older men living with HIV (10%) (3).

The incidence of stroke among adults living with HIV has increased with the introduction of combination antiretroviral therapy; adults living with HIV are more at risk of stroke with increased age and length of time using antiretroviral therapy (26).

The incidence rate for ischemic stroke among adults living with HIV has increased to 0.2% in 2006, compared to 0.1% in 1997 (26-28). HIV/AIDS also increases the risk of hemorrhagic stroke, but the risks are higher among the younger adults living with HIV compared to older adults living with HIV (27).

Disability Experienced by Adults with Stroke

Stroke can result in hospitalization and increased risk for developing opportunistic infections (27, 28). The occurrence of stroke may result in a combination of physical, cognitive, speech and mental health impairments, activity limitations, and social participation restrictions (29).

Injuries that can be sustained from the occurrence of a stroke include pressure sores, and pain in shoulder and other areas. Injuries from falls can also occur (29). Psychological challenges faced as a result of stroke include depression, anxiety, emotionalism, and confusion (29).

We present eight recommendations for rehabilitation, cognitive rehabilitation, exercise and therapeutic modality interventions for adults with living with HIV and stroke.

E.1 – Cognitive Rehabilitation

Recommendation 29a: Inconclusive or insufficient evidence exists to derive recommendations for **cognitive rehabilitation** interventions for older adults with HIV and stroke. While cognitive rehabilitation does not appear harmful, weak evidence exists to support the use of cognitive-specific interventions to improve spatial neglect, disability, memory, and functional status for older adults who experience stroke.

Recommendation 29b: Rehabilitation professionals should implement specific task oriented training with older adults living with HIV and stroke as this approach is key to retraining skill specific tasks related to function.

Explanatory Notes: Despite the lack of strong evidence supporting cognitive rehabilitation in stroke, neurocognitive impairments are a major concern for the aging people living with HIV/AIDS (PLHIV) population. There may be specific considerations for older adults with HIV with pre-existing neurocognitive impairments and stroke. From a rehabilitation perspective it will be important to obtain a clear baseline to determine what neurocognitive issues are specific to stroke.

Level of Evidence: Moderate (systematic review but not Cochrane) to High (Cochrane review)
Age of Participants in Research Evidence: Majority of mean age >50 years [#730 younger participants]

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peer review only



E.2 – Rehabilitation

Recommendation 30: Stroke rehabilitation for older adults with HIV should be multi-disciplinary including occupational therapy, physical therapy, and speech-language pathology to improve the ability to undertake personal activities of daily living and reduce risk of deterioration in ability. Stroke rehabilitation may include the following components: therapeutic exercise, task-oriented training, gait-oriented training, balance training, strength training, wheelchair mobility, home modification, cognitive adaptation, and treatment of shoulder subluxation for those who experience a **sub-acute or post-acute stroke (within 1 year)**.

Specifically:

Recommendation 30a: Repetitive, task-related training in rehabilitation for lower limbs should be recommended to enhance functional activity, walking distance; walking speed; sit-to-stand, activities of daily living; measures of walking ability, and global motor function.

Recommendation 30b: Very early mobilization should be promoted for older adults with HIV to enhance earlier independent mobility.

Recommendation 30c: Passive sensory training (cutaneous electrical stimulation) may be recommended to improve hand function and dexterity in older adults living with HIV with stroke whereas evidence supporting improvements in spasticity and muscle strength is less convincing. Caution should be taken for this intervention for individuals with peripheral neuropathy due to altered sensation.

Recommendation 30d: Task-oriented circuit class training should be recommended to enhance gait and gait-related activities as evidence demonstrates this intervention is effective in improving walking ability, walking speed and balance however rehabilitation professionals should be aware of the potential for falls during any rehabilitation sessions and should put strategies in place to prevent against falls.

Recommendation 30e: Strength training should be recommended post stroke as it is not associated with increases in spasticity.

Level of Evidence: High (CPGs and Cochrane systematic reviews) and Moderate (systematic review but not Cochrane) to High (Cochrane review)

Age of Participants in Research Evidence: Majority of studies mean age > 50 years [2 studies had no age info] and Studies with participant >18 years

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45 physical therapy on functional outcomes after stroke: what's the evidence? *Clinical Rehabilitation*. 2004;
46 18(8): 833-862.

47
48
49 **E.3 - Rehabilitation (Occupational Therapy)**

50 **Recommendation 31: Occupational therapy should be recommended** as a component of
51 rehabilitation for older adults living with HIV with stroke as interventions targeted towards
52 personal activities of daily living may increase activities of daily living (ADLs) and reduce
53 mortality, deterioration and dependency.
54

1
2
3 **Level of Evidence:** Moderate (meta-analysis and systematic reviews but not Cochrane)
4

5 **Age of Participants in Research Evidence:** Mean age 71 years
6

7 **References**

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19

20 **E.4- Rehabilitation (Physical Therapy)**

21
22 **Recommendation 32: Physiotherapy** comprised of a combination of interventions should
23 be recommended for the recovery of postural control and lower limb function for older
24 adults living with HIV following stroke.
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27 **Level of Evidence:** Moderate (systematic review but not Cochrane)
28

29 **Age of Participants in Research Evidence:** Studies with participant >18 years
30

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37 **E.5 - Rehabilitation (Electromechanical and robotic gait training)**

38
39 **Recommendation 33: Electromechanical-assisted gait training** in combination with
40 physiotherapy may be recommended for older adults living with HIV with stroke
41 (particularly those within 3 months post stroke) as this intervention is associated with a
42 higher likelihood to achieve independent walking than gait training alone.
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47 **Level of Evidence:** High (Cochrane systematic review)
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49 **Age of Participants in Research Evidence:** Mean age 61 years
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E.6 – Exercise

Recommendation 34: Combined aerobic and resistive exercise should be a component of stroke rehabilitation for older adults living with HIV with stroke who are medically stable at any stage of motor recovery. Higher doses of exercise may be associated with better motor recovery. Specifically, **cardiorespiratory training** should be a component of exercise as evidence suggests speed, tolerance and independence during walking are improved. In addition, **strength training** may be a component of exercise as this can improve muscle strength in stroke patients and will not necessarily increase spasticity.

Level of Evidence: High (combination of systematic reviews and Cochrane reviews)

Age of Participants in Research Evidence: Majority of studies mean age >50 years

References

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E.7 - Electrotherapeutic Modalities

Recommendation 35: Electrotherapeutic modalities in isolation are not recommended for older adults living with HIV with stroke over conventional rehabilitation interventions strategies. Very weak to no evidence exists to support the use of electrotherapeutic modalities (functional electrical stimulation, biofeedback, visual feedback therapy) over conventional physical therapy interventions alone for muscle strength recovery, upper limb recovery or balance post stroke.

Explanatory Notes: Impairment-focused interventions alone such as biofeedback, neuromuscular or transcutaneous nerve stimulation fail to generalize to functional improvements and are not recommended in isolation for older adults with HIV and stroke. Particular caution should be taken by rehabilitation professionals working with older adults with HIV who may not have complete intact sensation as they may be at risk for injury with intervention such electronic stimulation, electrotherapeutic modalities.

Level of Evidence: Moderate (systematic reviews and meta-analyses but not Cochrane)

Age of Participants in Research Evidence: Mean age >50 years and Studies with participant >18 years

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Category
F

Cardiovascular Disease (CVD)

HIV disease has been associated with an increased risk of cardiovascular complications (30). Dyslipidemia (abnormal amounts of lipid in the blood), insulin resistance, and central obesity coupled with an aging HIV-positive population have led to an increased incidence of cardiovascular events for adults with HIV (31).

The prevalence of hypertension among adults living with HIV ranged from 41% to 54% between 2000 and 2007 with rates higher for women compared to men in the same population (3, 16).

The prevalence of heart disease among adults living with HIV is 15%, Rates of heart disease in women (23%) is more than 2 times the rate of men living with HIV (12%) (3, 16).

The prevalence of coronary heart disease among adults living with HIV ranges from 7–8% (32).

The prevalence of asymptomatic ischemic heart disease among adults ages 50-59 years living with HIV is 13%, and increases to 17% for adults 60 years or older (33).

The prevalence of asymptomatic peripheral arterial disease (PAD) is low, but identified only in adults living with HIV with high cardiovascular risk (31).

Disability Experienced by Adults with Cardiovascular Disease (CVD)

Cardiovascular risks include abnormally elevated levels of lipids and/or lipoproteins in the blood (hyperlipidaemia), fat redistribution syndrome, insulin resistance, diabetes mellitus, hypertension and increased hospitalization (16, 30, 33, 34).

Cardiovascular disease can also lead to events such as a myocardial infarction resulting in a range of impairments, activity limitations and participation restrictions for adults with HIV.

We present six recommendations for rehabilitation and exercise interventions for older adults with HIV and cardiovascular disease, myocardial infarction, heart disease, or heart failure.

Fi) Cardiovascular Disease (CVD)

Fi.1 – Cardiac Rehabilitation

Recommendation 36: Cardiac rehabilitation in the form of **home-based or centre-based care** may be recommended because these appear equally effective in improving the clinical & health related quality of life outcomes for older adults with HIV with low risk **cardiovascular disease**. The choice of home versus centre-based care should be reflective of the individual preference of the patient as this may impact the uptake of rehabilitation.



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2 **Level of Evidence:** High (Cochrane reviews) and Moderate (systematic reviews and meta-analyses but not
3 Cochrane)
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5 **Age of Participants in Research Evidence:** Majority of mean age >50 years and Mean age >55 years
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15 10.1002/14651858.CD007130.pub2.
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29 Mullen PD, Mains DA & Velez R. A meta-analysis of controlled trials of cardiac patient education. *Patient*
30 *Education & Counseling*. 1992; 19(2): 143-162. DOI: 10.1016/0738-3991(92)90194-N.
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33 **Recommendation 37: Cardiac rehabilitation** for older adults with HIV should include
34 reinforcement, feedback, offer opportunity for individualization, facilitate behaviour
35 change through skills and resources and be relevant to patients' needs and abilities.
36 Specifically, **motivational communication** such as formal cardiac rehabilitation program
37 referral, reminder letters, phone calls and home visits may be recommended for
38 increasing uptake and adherence of cardiac rehabilitation among older adults living with
39 HIV and cardiovascular disease.
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46 **Level of Evidence:** High (Cochrane reviews) and Moderate (systematic reviews and meta-analyses but not
47 Cochrane)
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49 **Age of Participants in Research Evidence:** Majority of mean age >50 years and Mean age >55 years
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Herkner H, Thoennissen J, Nikfardjam M, Koreny M, Laggner AN & Mullner M. Short versus prolonged bed rest after uncomplicated acute myocardial infarction: a systematic review and meta-analysis. *Journal of Clinical Epidemiology*. 2003; 56(8): 775-781.

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Fii) CVD - Myocardial Infarction

Fii.1 – Cardiac Rehabilitation

Recommendation 38a: Exercise-based cardiac rehabilitation should be recommended for older adults with HIV who have undergone a myocardial infarction (MI) (otherwise known as a heart attack) (or at risk of an MI) given evidence suggests exercise based cardiac rehabilitation is effective in reducing cardiac deaths. The ideal frequency, intensity, time and type of exercise to maximize benefits are unclear.

Recommendation 38b: Early mobilization and rehabilitation and specifically, **secondary and tertiary prevention programs** (including counseling, education, and exercise) should be recommended to older adults living with HIV who experience an MI as these have the potential to reduce subsequent MI and mortality and improve processes of care, risk factor profiles and functional status and quality of life.

Level of Evidence: High (Cochrane reviews) and Moderate (systematic reviews and meta-analyses but not Cochrane)

Age of Participants in Research Evidence: Majority of mean age >50 years and Mean age >55 years

References

Davies EJ, Moxham T, Rees K, Singh S, Coats AJS, Ebrahim S, Lough F & Taylor RS. Exercise based rehabilitation for heart failure. *Cochrane Database of Systematic Reviews* 2010, Issue 4. Art. No.: CD003331. DOI: 10.1002/14651858.CD003331.pub3.

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Fiii) CVD - Coronary Artery Disease and Coronary Heart Disease

Fiii.1 – Exercise

Recommendation 39: Moderate intensity exercise (and potentially progressive resistive exercise) should be recommended for older adults with HIV with **cardiovascular disease** who are medically stable to reduce high blood pressure and potentially mitigate the effect of coronary heart disease. Exercise may be associated with improved cardiovascular health and well-being as a result of enhanced self-efficacy. More research is required to determine the ideal frequency and duration of exercise that should be recommended to see psychological improvement. **High intensity aerobic exercise** may increase High Density Lipoprotein Cholesterol (HDL-C) levels, while **combined aerobic and resistance exercise** may lower Low Density Lipoprotein Cholesterol (LDL-C) levels and should be recommended for older adults with HIV to improve their cardiovascular health.

Level of Evidence: Moderate (systematic reviews but not Cochrane)

Age of Participants in Research Evidence: Two of the studies had mean age >50 years whereas other two studies participant ranged 18-80 years

References

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Halbert JA, Silagy CA, Finucane P, Withers RT, Hamdorf PA & Andrews GR. The effectiveness of exercise training in lowering blood pressure: a meta-analysis of randomised controlled trials of 4 weeks or longer. *Journal of Human Hypertension*. 1997; 11(10): 641-649.

Fiv) CVD – Heart Failure

Fiv.1 – Exercise

Recommendation 40: Home-based moderate intensity exercise (and potentially progressive resistive exercise) as well as supervised and hospital-based exercise programs appear to be safe and should be recommended for older adults with HIV and heart failure who are medically stable for potential improvements in cardiac function, exercise capacity (including peak oxygen consumption), physical function, mortality and quality of life and potentially a reduction in hospital admissions. Optimal session frequency, session duration, exercise intensity, program duration is unclear.

Level of Evidence: High (combination of Cochrane systematic review and other systematic reviews) and Moderate (systematic review but not Cochrane)

Age of Participants in Research Evidence: Majority of studies mean age >50 years and Age range 19-83 years (only 6/31 studies had participant >80 years)

References

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4 exercise training on left ventricular remodeling in heart failure patients: The benefit depends on the type of
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12 evidence. British Journal of General Practice. 2002; 52(474): 47-55.
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14 Halbert JA, Silagy CA, Finucane P, Withers RT & Hamdorf PA. Exercise training and blood lipids in
15 hyperlipidemic and normolipidemic adults: a meta-analysis of randomized, controlled trials. European
16 Journal of Clinical Nutrition. 1999; 53(7): 514-522.
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21 **Recommendation 41: Aerobic exercise (and possibly resistive exercise) at least 3 times**
22 **per week may be recommended to older adults living with HIV and hyperlipidemia for the**
23 **potential to improve blood lipids. Clinical importance of the changes is unclear.**
24

25 **Level of Evidence:** Moderate (systematic review but not Cochrane)
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27 **Age of Participants in Research Evidence:** Age range 19-83 years (only 6/31 studies had participant >80
28 years
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30 Reference

31 Halbert JA, Silagy CA, Finucane P, Withers RT & Hamdorf PA. Exercise training and blood lipids in
32 hyperlipidemic and normolipidemic adults: a meta-analysis of randomized, controlled trials. European
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Category
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Mental Health Challenges

Although older adults living with HIV report more depressive symptoms and higher levels of life-stressor burden than their younger counterparts, older adults reported advanced age provided them with more adaptive coping and problem-solving skills. They also reported feeling less threatened by illness and disability compared to younger persons with HIV (16, 35, 36).

Depression in adults living with HIV is associated with neuropsychological impairment. Approximately 25% of older adults living with HIV are diagnosed with depression (36-38). The prevalence of psychological disorders (such as depression) among adults with HIV is 17%, and are more prevalent among older women living with HIV (23%) compared to older men living with HIV (14%) (3).

Disability Experienced by Adults with Mental Health Challenges

Challenges experienced by adults living with HIV and mental health issues include HIV-associated stigma, increased loneliness, decreased cognitive functioning, reduced level of energy, employment worries and reduced access to health care and social services due to AIDS-related stigma (36, 39, 40).

We present four recommendations for models of care, exercise, psychotherapy, and housing interventions for older adults living with HIV and varying forms of mental health issues.

Gi) Mental Health Challenges (Older adults with mental health issues)

Gi.1 – Models of Care

Recommendation 42: Inconclusive or insufficient evidence exists to support a recommendation for a specific model of mental health care (**acute psychogeriatric care over acute psychiatric units versus other mental health services**) for older adults with HIV living with **mental health issues**. More research is needed before recommending one model of care over another.

Level of Evidence: Moderate (systematic review but not Cochrane)

Age of Participants in Research Evidence: All participant >60 years

Reference

Draper B & Low L-F. What is the effectiveness of acute hospital treatment of older people with mental disorders? *International Psychogeriatrics*. 2005; 17(4): 539-555.



Gii) Mental Health Challenges (anxiety)

Gii.1 – Exercise

Recommendation 43: Exercise appears safe and should be recommended (approximately 30 minutes per session) to older adults with HIV living with other chronic conditions illnesses such as cardiovascular disease (CVD), cancer, chronic pain, fibromyalgia as a way to reduce symptoms of **anxiety**.

Level of Evidence: Moderate (systematic review and meta-analysis but not Cochrane)

Age of Participants in Research Evidence: Mean age 50 years

Reference

Herring MP, O'Connor PJ & Dishman RK. The effect of exercise training on anxiety symptoms among patients: a systematic review. *Archives of Internal Medicine*. 2010; 170(4): 321-331.

Giii) Mental Health Challenges (Depression)

Giii.1 – Psychotherapy

Recommendation 44: Inconclusive or insufficient evidence exists to support the use of **cognitive behavioural therapy** with older adults with HIV and **depression**.

Explanatory Notes: Despite inconclusive evidence, clinicians and PLHIV reported using this intervention in their practice with adults with HIV who are depressed.

Level of Evidence: High (Cochrane review)

Age of Participants in Research Evidence: All participants >55 years

Reference

Wilson K, Mottram PG & Vassilas C. Psychotherapeutic treatments for older depressed people. *Cochrane Database of Systematic Reviews* 2008, Issue 1. Art. No.: CD004853. DOI: 10.1002/14651858.CD004853.pub2.

Giv) Mental Health Challenges (severe mental illness)

Giv.1 – Housing Models

Recommendation 45: Supporting older adults living with HIV in securing **safe and stable housing** should be an important component of the rehabilitation process for older adults with HIV with **severe mental illness** given the positive impact of stable housing for this target population.

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2 **Level of Evidence:** Moderate (meta-analysis but not Cochrane)

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4 **Age of Participants in Research Evidence:** Younger adults (mean age 39 years)

5
6 **Reference**

7 Leff HS, Chow CM, Pepin R, Conley J, Allen IE & Seaman CA. Does one size fit all? What we can and can't
8 learn from a meta-analysis of housing models for persons with mental illness. *Psychiatric Services*. 2009;
9 60(4): 473-482.
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For peer review only



Category

H

Cognitive Impairments

As many as 50% of adults living with HIV report cognitive difficulties, which can be associated with neuropsychological impairment (41, 42).

HIV-associated neurocognitive disorders (HAND) has been divided into three subclasses: asymptomatic neurocognitive impairments, mild neurocognitive disorder and HIV-associated dementia (HAD) (43). The prevalence of HIV-associated dementia (HAD) ranges from 8-15% for older men and women living with HIV (44, 45). Approximately 15% of adults living with HIV have Minor Cognitive Motor Disorder (MCMD) (46).

The process of neurological decline similar to Alzheimer's disease and Parkinson's disease (Parkinsonism related to HIV) has been reported in adults living with HIV (4, 47). The prevalence of Parkinsonism related to HIV is very low, ranging from 1% to 5% (47).

Disability Experienced with Cognitive Impairments

The challenges faced by adults living with HIV and cognitive disorders may include lower attention, motor speed, constructional abilities (impairment forming designs, objects, or materials with hands, under visual guidance), and verbal memory (41, 48-51).

The challenges specific to HAD include psychomotor slowing, apathy and motor disorders, similar to the bradykinesia and postural and gait abnormalities observed in late Parkinson's disease (52).

We present three recommendations for cognitive rehabilitation and exercise interventions for older adults living with HIV with varying levels of neurocognitive impairments.

Hi) Cognitive Impairment – Mild to Moderate Cognitive Impairment

Hi.1 – Cognitive Rehabilitation

Recommendation 46: Cognitive interventions including cognitive training, cognitive stimulation, and cognitive rehabilitation should be recommended for older adults living with HIV with **mild cognitive impairment** because they are associated with significant improvements objective and subjective measures of memory, quality of life and mood / anxiety with benefits translated to improvements in daily functioning and mood. Specifically, **errorless learning** may be recommended for a potential positive effect on recall for older adults with HIV and cognitive impairment.

Level of Evidence: Moderate (systematic review but not Cochrane)

Age of Participants in Research Evidence: Younger and older adults with cognitive impairment

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Jean L, Bergeron ME, Thivierge S & Simard M. Cognitive intervention programs for individuals with mild cognitive impairment: Systematic review of the literature. *American Journal of Geriatric Psychiatry*. 2010; 18(4): 281-296.

Hauer K, Becker C, Lindemann U & Beyer N. Effectiveness of physical training on motor performance and fall prevention in cognitively impaired older persons: A systematic review. *American Journal of Physical Medicine and Rehabilitation*. 2006; 85(10): 847-857.

Kessels RPC & Haan EHF. Implicit Learning in Memory Rehabilitation: A Meta- Analysis on Errorless Learning and Vanishing Cues Methods', *Journal of Clinical and Experimental Neuropsychology*. 2003; 25(6), 805-814. DOI: 10.1076/jcen.25.6.805.16474.

Hii) Cognitive Impairment

Hii.1 – Exercise

Recommendation 47: A combination of aerobic and resistive (strengthening) exercise should be recommended for older adults living with HIV with cognitive impairment for improvements in fitness, physical function, cognitive function, and positive behaviour. Evidence suggests older adults with cognitive impairment may benefit from exercise as much as older adults with no cognitive impairment. Due to diversity in exercise programs, measures of cognition, and study populations in the evidence, the optional type of exercise program (content, intensity, frequency, and duration) is unclear.

Recommendation 47a: Specifically, aerobic exercise may be associated with improvements in neurocognitive function among older adults with HIV with cognitive impairment for attention and processing speed, executive function, and memory.

Level of Evidence: Moderate (systematic review and meta-analysis but not Cochrane)

Age of Participants in Research Evidence: Majority of studies included older adults >60 years

References

Smith PJ, Blumenthal JA, Hoffman BM, Cooper H, Strauman TA, Welsh-Bohmer K, Browndyke JN & Sherwood A. Aerobic Exercise and Neurocognitive Performance: A Meta-Analytic Review of Randomized Controlled Trials. *Psychosomatic Medicine*. 2010; 72(3): 239–252. DOI: 10.1097/PSY.0b013e3181d14633.

Heyn PC, Johnson KE & Kramer AF. Endurance and strength training outcomes on cognitively impaired and cognitively intact older adults: a meta-analysis. *Journal of Nutrition, Health & Aging*. 2008; 12(6): 401-409.

van Uffelen JG, Chin A Paw MJ, Hopman-Rock M & van Mechelen W. The Effects of Exercise on Cognition in Older Adults With and Without Cognitive Decline: A Systematic Review. *Clin J Sport Med*. 2008; 18(6):486–500.



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2 Heyn P, Abreu BC & Ottenbacher KJ. The effects of exercise training on elderly persons with cognitive
3 impairment and dementia: a meta-analysis. *Archives of Physical Medicine & Rehabilitation*. 2004; 85(10):
4 1694-1704.

5 6 **Hiii) Cognitive Impairment – Dementia**

7 8 **Hiii.1 – Exercise**

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10 **Recommendation 48:** Physical exercise appears to be safe and may be recommended for
11 older adults living with HIV and dementia however insufficient evidence exists to suggest
12 benefits to cognition, function, behaviour, depression, and mortality.
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15 **Level of Evidence:** High (majority Cochrane systematic reviews)
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18 **Age of Participants in Research Evidence:** Older adults >65 years
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20 **References**

21 Forbes D, Forbes S, Morgan DG, Markle-Reid M, Wood J & Culum I. Physical activity programs for persons
22 with dementia. *Cochrane Database of Systematic Reviews* 2008, Issue 3. Art. No.: CD006489. DOI:
23 10.1002/14651858.CD006489.pub2.
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26 Robinson L, Hutchings D, Dickinson HO, Corner L, Beyer F, Finch T, Hughes J, Vanoli A, Ballard C & Bond J.
27 Effectiveness and acceptability of non-pharmacological interventions to reduce wandering in dementia: a
28 systematic review. *International Journal of Geriatric Psychiatry*. 2007; 22(1): 9-22.
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Category

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Chronic Obstructive Pulmonary Disease (COPD)

Chronic Obstructive Pulmonary Disease (COPD) occurs in more than 5% of the general population of adults over 45 years of age (53). COPD includes chronic bronchitis, emphysema and asthma. The prevalence of COPD among older adults living with HIV ranges from 10 - 16%, and is more prevalent among women (21%) compared with men (14%) living with HIV (3, 54).

With an increased prevalence of smoking among people living with HIV compared to the general population, adults with HIV are at increased risk of developing COPD (3, 18).

Disability Experienced by Adults with COPD

Challenges faced by adults living with HIV and COPD may include small airways abnormalities and nonspecific airway hyper-responsiveness. Challenges may also include shortness of breath, decreased activity tolerance, and a productive cough (3, 54).

We present three recommendations for pulmonary rehabilitation, exercise, and inspiratory muscle training (IMT) interventions for older adults living with HIV and COPD.

I.1 – Pulmonary Rehabilitation

Recommendation 49: Pulmonary rehabilitation (including upper and lower extremity exercise, inspiratory muscle training and breathing exercises) for at least four weeks is safe and strongly recommended for older adults living with HIV who have chronic obstructive pulmonary disease (COPD) to reduce mortality, improve dyspnea, health-related quality of life, functional exercise capacity and reduce future hospital admissions. Individuals with more severe COPD may require longer rehabilitation programs of at least 6 months to demonstrate benefits.

Level of Evidence: High (combination of Cochrane systematic reviews and meta-analysis but not Cochrane)

Age of Participants in Research Evidence: Majority of participants >60 years

References

Puhan MA, Gimeno-Santos E, Scharplatz M, Troosters T, Walters EH & Steurer J. Pulmonary rehabilitation following exacerbations of chronic obstructive pulmonary disease. Cochrane Database of Systematic Reviews 2009, Issue 1. Art. No.: CD005305. DOI: 10.1002/14651858.CD005305.pub2.

Oh H & Seo W. Meta-analysis of the effects of respiratory rehabilitation programmes on exercise capacity in accordance with programme characteristics. Journal of Clinical Nursing. 2007; 16(1): 3-15.

Lacasse Y, Goldstein R, Lasserson TJ & Martin S. Pulmonary rehabilitation for chronic obstructive pulmonary disease. Cochrane Database of Systematic Reviews 2006, Issue 4. Art. No.: CD003793. DOI: 10.1002/14651858.CD003793.pub2.

I.2 – Exercise

Recommendation 50: Aerobic and progressive resistance exercise at least two times per week for at least 8 weeks appears feasible, safe and may be recommended for older adults with HIV with **mild to moderate chronic obstructive pulmonary disease (COPD)** for improvements in exercise capacity and muscle strength that may translate into improved activity performance and societal participation. Careful consideration is required when prescribing progressive resistance exercise programs for people with COPD who have comorbid health conditions.

Level of Evidence: Moderate (systematic reviews and meta-analyses but not Cochrane)

Age of Participants in Research Evidence: Mean age >58 years

References

O'Shea SD, Taylor NF & Paratz JD. Progressive resistance exercise improves muscle strength and may improve elements of performance of daily activities for people with COPD: A systematic review. *Chest*. 2009; 136(5): 1269-1283. Prepublished online September 4, 2009. DOI: 10.1378/chest.09-0029. Available from <http://chestjournal.chestpubs.org/content/136/5/1269.full.html>.

Chavannes N, Vollenberg JJH, van Schayck CP & Wouters EFM. Effects of physical activity in mild to moderate COPD: a systematic review. *British Journal of General Practice*. 2002; 52(480): 574-578.

I.3 – Inspiratory Muscle Training (IMT)

Recommendation 51: Inspiratory muscle training (IMT) is an important component of pulmonary rehabilitation and is strongly recommended for older adults living with HIV with chronic obstructive pulmonary disease (COPD) to improve inspiratory muscle strength and endurance, dyspnea, exercise capacity and quality of life. Optimal frequency, intensity, supervision and duration of IMT is unclear.

Level of Evidence: High (used Cochrane methodology)

Age of Participants in Research Evidence: Mean age 63 years

References

Geddes, E. L., O'Brien K, W. D. Reid, Brooks D & Crowe J. Inspiratory muscle training in adults with chronic obstructive pulmonary disease: a systematic review. *Respiratory Medicine*. 2008; 99(11): 1440-1458. DOI of original article: 10.1016/j.rmed.2008.07.005.

Lotters F, van Tol B, Kwakkel G & Gosselink R. Effects of controlled inspiratory muscle training in patients with COPD: A meta-analysis. *European Respiratory Journal*. 2002; 20(3): 570-576.

Category

J

Diabetes

The prevalence of diabetes mellitus (DM) among adults living with HIV ranges from 3-15% (3, 55, 56). Diabetes mellitus is 2 times more prevalent among men compared to women living with HIV (3). With the presence of Hepatitis C, the prevalence of diabetes mellitus can increase up to 6% from 3% (55, 56).

Risk factors for developing diabetes include advancing age, being male, long period of HIV infection, and specific ethnicity (African Descent, Hispanic/Latino and Aboriginal) (5).

Adults living with HIV on combination antiretroviral therapy are at increased risk of developing diabetes, thus individuals should be screened for diabetes at onset of therapy initiation and about two to six months after (5).

Disability Experienced by Adults with Diabetes

Challenges faced among adults living with HIV and diabetes are lower body mass index preceded by impaired insulin tolerance and resistance, and high rates of Hepatitis C-virus infections (56, 57).

We present one recommendation for exercise for older adults living with HIV and diabetes.

J.1 – Exercise

Recommendation 52: Aerobic resistive exercise for at least 8 weeks is strongly recommended for older adults living with HIV with diabetes (type 2) to improve cardiopulmonary fitness and ensure glucose control. Optimal frequency, intensity, time and type of exercise are unclear however evidence suggests increased exercise prescription, fitness testing, supervision and group sessions at a greater number of times per week may be associated with greater health benefits. See the specific guidelines for more details.

Explanatory Notes: Exercise may also be considered as a preventative approach to prevent type 2 diabetes among older adults with HIV. Exercise may be particularly important in building up strength among PLHIV who may have had muscle wasting and poor nutrition related to diabetes

Level of Evidence: High (combination of Cochrane systematic reviews and meta-analyses not Cochrane)

Age of Participants in Research Evidence: Three of four studies - participant mean age 55 years (type 2 diabetes)

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For peer review only



Figure 1: Overall Classification Evidence-Informed Recommendations

Stream A Recommendations
HIV Aging and Rehabilitation
Derived from 42 low or very low level evidence articles

Recommendation Theme	#
Preparedness of Rehabilitation Professionals	1
Approaches to Rehabilitation Assessment and Treatment (physical, mental, neurocognitive, uncertainty, social inclusion)	7
Extrinsic Factors to consider with rehabilitation of older adults with HIV (ageism, stigma, disclosure, social support)	3
Intrinsic Factors to consider with rehabilitation of older adults with HIV (self-management, spirituality)	2
Rehabilitation Approaches (interprofessional practice, CAM)	2
Rehabilitation Interventions (exercise)	1
Total # Recommendations	16

Stream B Recommendations
Rehabilitation Interventions in Comorbidities
Derived from 108 high level evidence articles (meta-analyses or systematic reviews)

Recommendation Classification	#
Bone and Joint Disorders Exercise, rehabilitation, self-management	4
Cancer Exercise	4
Stroke Rehabilitation, cognitive rehabilitation, electrotherapeutic modalities	7
Cardiovascular Disease Cardiac rehabilitation, exercise	6
Mental Health Exercise, psychotherapy, models of care and housing models	4
Cognitive Impairment Exercise, cognitive rehabilitation	3
COPD Pulmonary rehabilitation, inspiratory muscle training, exercise	3
Diabetes Exercise	1
Older Adults Exercise	3
HIV Exercise	1
Total # Recommendations	36

52 Detailed (Specific) Evidence-Informed Recommendations

Endorsement Rates for Each Recommendation Ranged from 53% - 100%

Overarching Recommendations on Rehabilitation for Older Adults with HIV (n=8)

1) Rehabilitation Professionals (RPs) should be **prepared to provide care** to older adults with HIV who present with complex comorbidities...

2) RPs should adopt an **individualized approach to practice, sensitive to unique values, preferences and needs** of older adults with HIV...

3) **Multidisciplinary rehabilitation** is strongly recommended across continuum of care...

4) RPs should consider the role of **extrinsic contextual factors** (stigma, ageism, HIV disclosure, social supports)....

5) RPs should consider the role of **intrinsic contextual factors** (self-management, spirituality)

6) **Aerobic and resistive exercise** may be recommended for older adults with HIV who are medically stable and living with comorbidities....

7) **Cognitive rehabilitation** interventions may be recommended for older adults with HIV with mild cognitive impairments and stroke...

8) In absence of high level evidence RPs should **refer to high level evidence for recommendations on interventions for a specific comorbidity**....

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Evidence-Informed Recommendations in Rehabilitation for Older Adults Living HIV

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14 *Association*. 2001; 93(7-8): 243-250.
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17 *Indicates four references (interventions) that were referred to in the document but were not in the final
18 recommendations.
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Data Supplement File 3 - Characteristics of Included Studies in the Final Evidence-Informed Recommendations

Stream A: HIV, Aging and Rehabilitation (n=42 studies)

Characteristic	Number (%)
Total number of included studies from which Stream A recommendations were derived	42
Sample size of participants across all included studies ~ ~based on 31/42 studies reporting sample size	4585 participants
Mean age of study participants (years) (range) + +based on data from 23/42 studies	50 years (42-68 years)
Gender of participants in included studies*	
Men	2497 (71%)
Women	1022 (29%)
Transgendered	10 (<1%)
*based on 27/42 studies reporting gender	
Country of origin of included studies	
United States	38 (90%)
Brazil	1 (2%)
Australia	1 (2%)
Not Reported	2 (5%)
Year of Publication (Range)	1991-2010
Methods of included studies	
Qualitative studies	9 (21%)
Quantitative studies	21 (50%)
Narrative reviews / commentary / editorial	12 (29%)
Study Designs (as classified on data extraction forms)	
Review / narrative review	13 (31%)
Cross-sectional studies	13 (31%)
Survey	8 (19%)
Intervention study (non-RCT)	2 (5%)
Qualitative – Focus Group	1 (2%)
Qualitative (other) – either cross-sectional or longitudinal	5 (12%)

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Final Theme Classification of Included Studies		
Overarching principles for rehabilitation of older adults with HIV	2	(5%)
Mental health (depression; neurocognition)	10	(24%)
Determinants of Health	2	(5%)
Uncertainty	1	(2%)
Physical health (aerobic capacity)	2	(5%)
Social inclusion	1	(2%)
Spirituality	4	(10%)
Strategies to address health challenges for older adults with HIV (lifestyle, coping, etc)	3	(7%)
Extrinsic factors that influence HIV and aging (social support, stigma, etc)	10	(24%)
Personal attributes further increasing the complexity of HIV and Aging	3	(7%)
Interventions (exercise; neurocognitive interventions)	4	(10%)

Stream B: Rehabilitation Interventions in Comorbidities (n=108 studies)

Characteristic	Number (%)
Total number of included studies from which Stream B recommendations were derived	108
Total number of individual studies / trials included in the systematic reviews and meta-analyses	2484
Sample size / total number of participants across all included studies in the systematic reviews and meta-analyses* *as reported in 102/108 studies	179,777 participants
Year of publication (range)	1992-2011
Type of comorbidity in included studies	
Bone and joint disorders	11 (10%)
Cancer	12 (11%)
Stroke	31 (29%)
Cardiovascular disease	16 (15%)
Mental Health	4 (4%)
Cognitive Impairment	10 (9%)
Chronic Obstructive Pulmonary Disease (COPD)	7 (6%)
Diabetes	4 (4%)
Older Adults	11 (10%)
HIV	2 (2%)
Study Design of Included Studies	
Cochrane systematic review*	36 (33%)
Meta-analysis	21 (19%)
Systematic review or Clinical Practice Guideline (CPG)*	24 (22%)
Systematic review and meta-analysis	27 (25%)
*Published by the Cochrane Collaboration/Wiley and/or follows Cochrane Collaboration protocol	

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Intervention Focus of Included Studies		
Biofeedback	1	(1%)
Education	1	(1%)
Electrical Stimulation	2	(2%)
Exercise	63	(58%)
Fall Prevention	1	(1%)
Housing Models	1	(1%)
Inspiratory Muscle Training	1	(1%)
Mobilization	1	(1%)
Models of Care	1	(1%)
Occupational Therapy	4	(4%)
Prevention Programs	1	(1%)
Psychotherapy	1	(1%)
Rehabilitation	27	(25%)
Self-Management Programs	1	(1%)
Strength Training	1	(1%)
Visual Feedback Therapy	1	(1%)

For peer review only

BMJ Open

Evidence-Informed Recommendations in Rehabilitation for Older Adults Living with HIV: A Knowledge Synthesis

Journal:	<i>BMJ Open</i>
Manuscript ID:	bmjopen-2013-004692.R1
Article Type:	Research
Date Submitted by the Author:	07-Apr-2014
Complete List of Authors:	O'Brien, Kelly; University of Toronto, Department of Physical Therapy Solomon, Patricia; McMaster University, School of Rehabilitation Science Trentham, Barry; University of Toronto, Department of Occupational Science and Occupational Therapy MacLachlan, Duncan; AIDS Committee of Toronto, MacDermid, Joy; McMaster University, School of Rehabilitation Science Tynan, Anne-Marie; St. Michael's Hospital, Baxter, Larry; Canadian Working Group on HIV and Rehabilitation, Casey, Alan; University of Manitoba, Department of Medicine Chegwidden, William; University College Hospitals NHS Foundation Trust, National Hospital for Neurology and Neurosurgery Robinson, Gregory; Canadian Working Group on HIV and Rehabilitation, Tran, Todd; Women's College Hospital, Wu, Janet; St. Michael's Hospital, Zack, Elisse; Canadian Working Group on HIV and Rehabilitation,
Primary Subject Heading:	HIV/AIDS
Secondary Subject Heading:	Rehabilitation medicine, Evidence based practice
Keywords:	HIV & AIDS < INFECTIOUS DISEASES, REHABILITATION MEDICINE, aging, knowledge synthesis, evidence-informed recommendations

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Manuscripts

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36 62 **Key Words:** HIV/AIDS, aging, rehabilitation, disability, knowledge synthesis, evidence-informed
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42 65 **Word Count:** 4461

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68 **ABSTRACT**

69 **Objective:** Our aim was to develop evidence-informed recommendations in rehabilitation for
70 older adults living with HIV.

71 **Design:** We conducted a knowledge synthesis, combining research evidence specific to HIV,
72 rehabilitation and aging, with evidence on rehabilitation interventions for common
73 comorbidities experienced by older adults with HIV.

74 **Methods:** We included highly relevant HIV-specific research addressing rehabilitation and aging
75 (stream A) and high-quality evidence on the effectiveness of rehabilitation interventions for
76 common comorbidities experienced by older adults aging with HIV (stream B). We extracted
77 and synthesized relevant data from the evidence to draft evidence-informed recommendations
78 on rehabilitation. Draft recommendations were refined based on people living with HIV (PLHIV)
79 and clinician experience, values and preferences, reviewed by an interprofessional team for
80 GRADE (quality) rating and revision, and then circulated to PLHIV and clinicians for external
81 endorsement and final refinement. We then devised overarching recommendations to broadly
82 guide rehabilitation for older PLHIV.

83 **Results:** This synthesis yielded eight overarching and 52 specific recommendations. Thirty-six
84 specific recommendations were derived from 108 moderate or high level research articles
85 (meta-analyses and systematic reviews) that described the effectiveness of rehabilitation
86 interventions for comorbidities that may be experienced by older adults with HIV.
87 Recommendations addressed rehabilitation interventions across eight health conditions: bone
88 and joint disorders, cancer, stroke, cardiovascular disease, mental health challenges, cognitive
89 impairments, chronic obstructive pulmonary disease, and diabetes. Sixteen specific

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3 90 recommendations were derived from 42 research articles specific to rehabilitation for older
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6 91 adults with HIV. The quality of evidence from which these recommendations were derived was
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9 92 either low or very low, consisting primarily of narrative reviews or descriptive studies with small
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11 93 sample sizes. Recommendations addressed approaches to rehabilitation assessment and
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13 94 interventions, and contextual factors to consider with rehabilitation of older adults living with
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16 95 HIV.

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18 96 **Conclusions:** These evidence-informed recommendations provide a guide for rehabilitation
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21 97 with older adults with HIV.
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3 98 **Strengths and Limitations of this Study**
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7 99 ■ We developed evidence-informed recommendations for rehabilitation with older adults
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9 100 living with HIV using a complex knowledge synthesis of two distinct areas of literature
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11 101 while incorporating people living with HIV and clinician preferences throughout.
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13 102 ■ Fifty-two recommendations were developed.
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17 103 ○ Thirty-six specific recommendations were derived from 108 moderate or high level
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19 104 research articles that described the effectiveness of rehabilitation interventions for
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21 105 comorbidities that may be experienced by older adults with HIV. Recommendations
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23 106 addressed rehabilitation interventions across eight health conditions commonly
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25 107 experienced by older adults with HIV.
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29 108 ○ Sixteen specific recommendations were derived from 42 research articles specific to
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31 109 rehabilitation for older adults with HIV.
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34 110 ■ To our knowledge, these are the first evidence-informed recommendations for
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36 111 rehabilitation developed specifically for older adults living with HIV.
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39 112 ■ Recommendations address approaches to rehabilitation assessment and interventions, and
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41 113 contextual factors to consider with rehabilitation of older adults living with HIV.
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117 INTRODUCTION

118 As adults age with HIV, more individuals are living with the physical, social and psychological
119 consequences of the disease, long term treatment, and comorbidities associated with aging [1-
120 4]. For many, HIV is experienced as a chronic illness whereby individuals experience a range of
121 health-related challenges known as **disability**, including symptoms and impairments (e.g.
122 fatigue, weakness, pain), difficulties with day-to-day activities (e.g. household chores),
123 challenges to social inclusion (e.g. ability to work) and uncertainty or worrying about future
124 health as they age [5-7]. Premature onset of cardiovascular disease [8], diabetes [8], bone and
125 joint disorders [9], neurocognitive disorders [10] and non-AIDS-defining cancers [11] further
126 add to the complexity of disability aging with HIV [12-16]. Rehabilitation has become an
127 increasingly important strategy to address disability experienced by adults aging with HIV and
128 specifically older adults living with comorbidities [17].

129 **Rehabilitation** is broadly defined as any service or health provider that may address or
130 prevent impairments, activity limitations or social participation restrictions experienced by an
131 individual [17]. Rehabilitation assists in managing the health-related challenges or disability
132 associated with HIV such as adverse effects of medications, fatigue, pain, neuropathy, mental
133 health problems, cognitive problems and issues related to income and vocational support.
134 Rehabilitation approaches such as physical therapy and occupational therapy are well
135 established in complex chronic disease management and are associated with improvements in
136 health outcomes in cardiovascular disease [18], stroke [19], and cancer [20]. However,
137 rehabilitation in the context of HIV is still emerging. Few rehabilitation professionals work with
138 people living with HIV (PLHIV) highlighting a gap in service provision and need for further HIV

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3 139 knowledge, training and clinical guidance [21]. Evidence-informed guidelines are essential to
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6 140 enhance awareness among clinicians, researchers, educators, and PLHIV and to optimize HIV
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8 141 rehabilitation for older adults with HIV.
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11 142 No known guidelines specific to HIV rehabilitation and aging exist. Developing evidence-
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13 143 informed recommendations in an emerging area of practice is challenging when high levels of
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15 144 evidence in the form of systematic reviews and meta-analyses are often not available. Such is
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17 145 the case with HIV, which has transitioned from an acute fatal illness to a chronic condition since
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19 146 the advent of combination antiretroviral therapies became available in developed countries in
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21 147 the mid-1990s. Combining lower level evidence on emerging issues of HIV and aging with
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23 148 higher level evidence on rehabilitation interventions for other health conditions experienced by
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25 149 older adults with HIV can provide a strong foundation for the development of evidence-
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27 150 informed recommendations. Our aim was to develop evidence-informed recommendations in
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29 151 rehabilitation for older adults living with HIV.
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37 152 **METHODS**

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39 153 We conducted a knowledge synthesis combining two streams of evidence: A) highly relevant
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41 154 HIV-specific evidence addressing rehabilitation and aging and B) high quality evidence on the
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43 155 effectiveness of non-pharmacologic rehabilitation interventions for comorbidities commonly
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45 156 experienced by older adults aging with HIV. Synthesizing this evidence allowed us to consider
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47 157 emerging literature specific to HIV and aging while taking advantage of existing high level
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49 158 evidence on interventions for common conditions experienced by older adults and customizing
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51 159 it to older adults with HIV.
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3 160 This research was led by an interdisciplinary team of researchers, educators, health
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6 161 providers with expertise in HIV, aging, and rehabilitation and PLHIV with lived experience of
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9 162 aging with HIV. The team engaged in all aspects of this study including the identification,
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11 163 appraisal and synthesis of the literature, and development and refinement of the evidence-
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13 164 informed recommendations. We incorporated PLHIV values and preferences and clinical
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16 165 expertise throughout [22]. This research received Research Ethics Board approval from
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19 166 McMaster University, Hamilton, Ontario, Canada.

21 22 167 **Searching and Identifying the Literature and Data Extraction**

23 24 25 168 *Stream A) Evidence specific to HIV, aging and rehabilitation*

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28 169 We conducted a synthesis of published literature specific to HIV, aging and rehabilitation. We
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30 170 searched electronic databases including MEDLINE, CINAHL, EMBASE, PsycINFO, from 1980 to
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33 171 December 2010. Search terms included: HIV, aging, and rehabilitation and were altered
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35 172 depending on the database. We included studies that addressed issues related to HIV, aging
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38 173 (older adults 50 years and older) and rehabilitation, and were published in the English language.
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40 174 We defined 'rehabilitation' as any non-pharmacological services, interventions, or providers
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43 175 who address or prevent impairments, activity limitations and social participation restrictions
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45 176 experienced by an individual [17]. Given this is an emerging area of literature; all study designs,
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48 177 including narrative reviews were included.

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51 178 *Stream B) High level evidence on rehabilitation interventions specific to comorbidities that may*
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54 179 *be experienced by older adults living with HIV*

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3 180 We searched for high-quality evidence (systematic reviews and meta-analyses) on the
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6 181 effectiveness of non-pharmacologic rehabilitation interventions for comorbidities that may be
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9 182 experienced by older adults aging with HIV. We searched electronic databases including
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11 183 MEDLINE, CINAHL, EMBASE, PsycINFO, the Cochrane Database of Systematic Reviews, and the
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13 184 National Guideline Clearinghouse from 1980 to August 2011 for systematic reviews and meta-
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16 185 analyses related to common comorbidities. We included systematic reviews or meta-analyses
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18 186 that addressed one or more comorbidities experienced by adults living with HIV which included
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21 187 but were not limited to: bone and joint disorders, cancer, cardiovascular disease, mental
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23 188 health, neurocognitive decline, cardiopulmonary disease, diabetes and were published in
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29 190 Five individuals independently reviewed abstracts from Stream A and B evidence to
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32 191 determine their eligibility for inclusion. Where disagreements occurred, the full text was
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34 192 retrieved and a third reviewer determined final inclusion [23]. Two individuals independently
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37 193 reviewed full articles for inclusion. In situations of disagreement reviewers discussed articles to
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39 194 reach consensus on final inclusion. Five individuals independently extracted data from the final
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42 195 group of included evidence onto a data charting form. Data extracted from Stream A evidence
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44 196 included author, year, study location, study purpose, study design, intervention type and
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47 197 comparison group if any, details of the intervention, study populations, sample size, outcome
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49 198 measures, key results, authors' overall conclusions, and reviewers' interpretations of important
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52 199 considerations and recommendations for HIV rehabilitation and aging. Data extracted from
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55 200 Stream B evidence included author, year, study purpose, study design (systematic review or
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57 201 meta-analysis), characteristics of participants, number of included studies, sample size,
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3 202 intervention(s) and comparison group (if any), frequency, intensity, time and type of each
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6 203 intervention, outcome measures, key results, overall author conclusions, and reviewers'
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9 204 interpretations of considerations for developing evidence-based recommendations for older
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11 205 adults living with HIV.

14 206 **Development of the Recommendations**

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17 207 We developed the evidence-informed recommendations using a three-phase iterative process
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19 208 involving 1) classification, grading methodological quality, synthesis of the evidence, and
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21 209 drafting the preliminary recommendations, 2) interprofessional team review, grading and
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23 210 revision of recommendations incorporating values and preferences, and 3) external
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25 211 endorsement and final refinement.
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30 212 **PHASE 1 - Classification, Grading Methodological Quality, Synthesis and Drafting the**

32 213 **Preliminary Recommendations (Figure 1)**

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35 214 Our search yielded a total of 6664 independent citations (2512 from stream A and 4152 from
36
37 215 stream B), of which 165 studies (50 studies from Stream A, and 115 studies for Stream B) met
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39 216 our inclusion criteria. Overall, our Phase 1 synthesis yielded 25 recommendations from Stream
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41 217 A evidence, and 49 recommendations from Stream B evidence for a total of 74 preliminary
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43 218 recommendations.
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48 219 *Stream A - Evidence specific to HIV, rehabilitation and aging*

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51 220 We classified the evidence (n=50 studies) based on 11 concepts to draft the preliminary
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53 221 recommendations ranging from overarching principles for rehabilitation with older adults living
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55 222 with HIV to interventions (Figure 1). We then assessed the methodological quality of each
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3 223 included article and the quality of the collective group of evidence from each of the 11 key
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6 224 concepts used to draft each recommendation using GRADE methodological quality criteria [24-
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8 225 28]. Two authors knowledgeable in HIV, aging and rehabilitation (AMT, KO) independently
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11 226 synthesized the extracted data using directed content analysis techniques [29] and formulated
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13 227 key themes surrounding rehabilitation assessment and treatment that informed the
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16 228 recommendations. One author (KO) then drafted 25 preliminary recommendations by
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18 229 synthesizing results and conclusions from each collective group of evidence. Subsequently, two
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21 230 authors (PS, KO) met to review the accuracy of the content analysis and collectively agreed on
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23 231 preliminary evidence-informed recommendations specific to HIV, aging and rehabilitation.
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27 232 *Stream B - High level evidence on rehabilitation interventions for common comorbidities*
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29 233 We grouped Stream B evidence by comorbidity experienced by older adults living with HIV,
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32 234 followed by the respective intervention. We classified the evidence based on 11 areas (bone
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34 235 and joint disorders; cancer; stroke; cardiovascular disease (CVD); mental health challenges;
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36 236 cognitive impairments; Parkinson's Disease; chronic obstructive pulmonary disease (COPD);
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39 237 diabetes; older adults; HIV) (Figure 1). We assessed the methodological quality of each article,
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42 238 and the quality of evidence from each collective area of focus used to draft each
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44 239 recommendation using the GRADE criteria [24-28]. Two authors (KO, AMT) independently
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46 240 synthesized the recommendations from the meta-analyses and systematic reviews using
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49 241 directed content analysis techniques [29] surrounding assessment, treatment intervention,
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52 242 intensity, progression of intensity, and health outcomes for each comorbidity. One author (KO)
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54 243 then drafted a total of 49 preliminary recommendations from the 115 included articles by
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57 244 synthesizing each collective group of study results and overall conclusions. Two authors (KO, PS)
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3 245 met to review the accuracy of the synthesis to collectively determine preliminary evidence-
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6 246 informed recommendations for each of the comorbidities. The resulting 49 recommendations
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9 247 for Stream B spanned 11 areas of focus: bone and joint disorders (6 recommendations); cancer
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11 248 (8); stroke (12); CVD (7); mental health challenges (4); cognitive impairments (3); Parkinson's
12
13 249 disease (1); COPD (4); diabetes (1); older adults (2); and HIV (1).
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17 250 **PHASE 2 – Research Team GRADING of Recommendations and Incorporating Values and**
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19 251 **Preferences among PLHIV and Clinicians (Figure 2)**
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22 252 We circulated the 74 preliminary recommendations to researchers, PLHIV and clinicians on the
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25 253 synthesis team in order to obtain GRADE ratings for the recommendations and incorporate
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28 254 individual experiences, values and preferences. For each recommendation, the team member
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30 255 indicated the GRADE rating incorporating both quality of the evidence and the extent to which
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33 256 the recommendation was applicable to older adults living with HIV. GRADE rating at this stage
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35 257 included four levels [24-28]: **High** – fully endorse or strongly recommended. This
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38 258 recommendation would be appropriate for the majority of older adults living with HIV,
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40 259 suggested wording of the recommendation would include; 'we should or should not do';
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43 260 **Moderate** – moderately endorse or recommend. This recommendation would be applicable to
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45 261 some older adults with HIV; **Low** - minimally endorse or weak recommendation. This
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48 262 recommendation would be applicable to a few older adults with HIV, with potential variability
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50 263 in values and preferences. Wording of this recommendation would include; 'we suggest, may
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53 264 recommend or may not recommend'; or **Very low** - do not endorse or do not recommend at all.
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55 265 This recommendation would not be appropriate for older adults living with HIV.
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3 266 This phase of GRADE rating required a trade-off between benefits and drawbacks, and
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6 267 values and principles of the PLHIV, clinician or researcher. Team members were asked to
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9 268 comment on their values and preferences related to the recommendation and how these
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11 269 influenced their rating. Team members also suggested revisions or refinement to the
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14 270 recommendation.

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17 271 Collectively the evidence specific to HIV aging and rehabilitation (Stream A) was low to
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19 272 very low quality as much of the evidence consisted of cross-sectional qualitative or quantitative
20
21 273 studies (with no comparison group) or narrative reviews. No randomized-controlled trials
22
23
24 274 (RCTs) were included. Clinicians and PLHIV on the team incorporated their clinical expertise and
25
26
27 275 experience, values and preferences, respectively, when determining their final GRADE rating.
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29 276 For Stream B given only systematic reviews or meta-analyses were included, the rating of the
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32 277 evidence was either very high or high. However, the GRADING of the recommendation
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34 278 depended on the extent to which the team felt the evidence was applicable to older adults with
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37 279 HIV and if the intervention posed minimal risk or harm to those living with HIV and these
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39 280 comorbidities.

41 42 43 281 **Phase 2 GRADE Results**

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46 282 The research team met twice to discuss the overall GRADE results, and recommendations for
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48 283 revision (Research Team Meetings #2 and #3). In the latter meeting we summarized and
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51 284 incorporated values and preferences of PLHIV and clinicians into the recommendations (Figure
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3 287 *Stream A - GRADE RATING RESULTS and REVISION*
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7 288 We consolidated similar or overlapping recommendations and deleted those not highly
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9 289 endorsed by the majority of the team. We also removed recommendations to specific
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11 290 interventions with inconclusive evidence because of team concerns of endorsing specific
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14 291 interventions over others under-reported in the research evidence.
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18 292 Overall this process resulted in the deletion of eight articles. The remaining 42 articles
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20 293 in Stream A yielded 16 evidence-informed recommendations for older adults with HIV that
21
22 294 spanned three themes: 1) implications for future education of rehabilitation professionals (1
23
24 295 recommendation); 2) approaches to rehabilitation assessment and treatment (14
25
26 296 recommendations); and 3) interventions (1 recommendation) (Figure 2).
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31 297 *Stream B - GRADE RATING RESULTS and REVISION*
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34 298 Based on the GRADE rating of team members and our meeting discussions we revised the
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36 299 Stream B recommendations. We deleted recommendations that were not endorsed by the
37
38 300 clinicians and PLHIV and recommendations that referred to conditions not common to HIV and
39
40 301 aging. Overall this process resulted in the removal of 6 articles. The remaining 109 articles in
41
42 302 Stream B yielded 40 evidence-informed recommendations that spanned the 10 areas: bone and
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44 303 joint disorders, cancer (general, lung and metastatic cancer), stroke, CVD (myocardial infarction,
45
46 304 heart disease, heart failure), mental health challenges, cognitive impairment, COPD, diabetes,
47
48 305 older adults and HIV/AIDS (Figure 2). Recommendations spanned interventions including
49
50 306 exercise, rehabilitation, self-management, cognitive rehabilitation, pulmonary rehabilitation,
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3 307 electrotherapeutic modalities, cardiac rehabilitation, inspiratory muscle training,
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6 308 psychotherapy, models of care, and housing models.
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9 309 **PHASE 3 - EXTERNAL ENDORSEMENT- Incorporating 'expert knowledge' from clinicians and**
10
11 310 **adults living with HIV (Figure 3)**
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15 311 We circulated the recommendations electronically to a broader group of 38 clinicians and PLHIV
16
17 312 for external endorsement using an online survey. We asked participants whether they
18
19
20 313 endorsed, did not endorse, or had no opinion about each recommendation. Participants were
21
22 314 also invited to provide comments. We considered endorsement rates of >80%, 60-80%, and
23
24 315 <60% as high, moderate and low levels of endorsement, respectively. Responses from this
25
26
27 316 endorsement phase were incorporated into the final revision and refinement of the evidence-
28
29
30 317 informed recommendations (Figure 3).
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33 318 **External Endorsement Results:** Of the 38 PLHIV and clinicians invited to participate in the online
34
35 319 endorsement survey, 19 (50%) completed the online survey. Of the 19 individuals who
36
37 320 completed the endorsement survey, 9 (47%) were health professionals, 8 (42%) were PLHIV and
38
39 321 2 (11%) were both a health professional and PLHIV. Health professionals included physicians
40
41 322 (geriatrics and infectious diseases) (27%), occupational therapists (27%), speech-language
42
43 323 pathologists (27%) and social workers (18%).
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48 324 Rates of endorsement for each recommendation ranged from 47% (9/19 participants) to
49
50 325 100% (19/19 participants). The number of participants who viewed the citations from which
51
52 326 the recommendations were derived ranged from three (16%) to 10 participants (53%).
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56 327 Participants tended to highly endorse recommendations in Stream A and those in Stream B
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3 328 related to exercise. Recommendations related to inconclusive evidence had lower rates of
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6 329 endorsement. Endorsement participants highlighted how recommendations could be
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8
9 330 applicable to any population (not just older adults with HIV). Others recommended highlighting
10
11 331 other interventions not captured in the recommendations, such as yoga or tai-chi. See Data
12
13 332 Supplement File 1 for an overview of the endorsement results.

14
15
16 333 Two recommendations endorsed by <60% of participants were removed. The team
17
18 334 further synthesized the final 52 specific recommendations into eight overarching
19
20
21 335 recommendations on rehabilitation for older adults living with HIV. See Data Supplement File
22
23 336 2 for the final evidence-informed recommendations and Data Supplement File 3 for
24
25
26 337 characteristics of included studies in the final recommendations.

27 28 338 **Final Recommendations**

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31 339 Results of this synthesis are presented across two streams that represent the two different
32
33 340 bodies of research evidence totaling 52 specific recommendations (Data Supplement File 2).
34
35
36 341 We also present overarching recommendations derived from the specific detailed evidence-
37
38 342 informed recommendations on rehabilitation for older adults living with HIV (Table 1).

39 40 41 343 *Specific (Detailed) Recommendations*

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43
44 344 Stream A results include 16 recommendations derived from 42 research evidence articles
45
46
47 345 specific to rehabilitation for older adults living with HIV. The level of evidence from which these
48
49 346 recommendations were derived was either low or very low, meaning the articles were mostly
50
51
52 347 narrative review articles or descriptive studies (either qualitative or quantitative) with small
53
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55 348 sample sizes. Although the studies were low level evidence, the PLHIV and clinician
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57 349 endorsements indicated that these were of fundamental importance in management of
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3 350 disability in older adults living with HIV. Stream A recommendations serve as the contextual
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5
6 351 backdrop to providing rehabilitation care, treatment and support to older adults living with HIV.
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8
9 352 Some of the recommendations have additional explanatory notes to further explain the context
10
11 353 and PLHIV and clinician values (Data Supplement File 2). The recommendations are organized
12
13 354 into six categories: A) preparedness of rehabilitation professionals; B) approaches to
14
15
16 355 rehabilitation assessment and treatment of older adults living with HIV; C) extrinsic factors to
17
18 356 consider with rehabilitation of older adults living with HIV; D) intrinsic factors to consider with
19
20
21 357 rehabilitation of older adults living with HIV; E) rehabilitation approaches; and F) rehabilitation
22
23 358 interventions (Data Supplement File 2).

24
25
26
27 359 Stream B results include 36 recommendations derived from 108 moderate or high level
28
29 360 research evidence articles describing the effectiveness of rehabilitation interventions for adults
30
31
32 361 living with health conditions and include specific considerations when applying rehabilitation
33
34 362 interventions for older PLHIV (Figure 3). Stream B recommendations include an overview of
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36
37 363 the prevalence of the condition among older adults with HIV, main health-related challenges
38
39 364 for older adults with HIV experiencing this condition from a rehabilitation perspective, study
40
41
42 365 citations and level of evidence from which the recommendation was derived, age of
43
44 366 participants included in the evidence (not all high level rehabilitation intervention evidence was
45
46
47 367 specific to older adults). The recommendations include specific considerations for older adults
48
49 368 with HIV. The recommendations are presented based on interventions across A) older adults, B)
50
51
52 369 HIV/AIDS, and eight common comorbidities that may be experienced by older adults with HIV;
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54
55 370 C) bone and joint disorders, D) cancer, E) stroke, F) cardiovascular disease, G) mental health
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57 371 challenges, H) cognitive impairments, I) COPD and J) diabetes (Data Supplement File 2).
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3 372 *Overarching Recommendations*
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7 373 To facilitate knowledge transfer and exchange, we established overarching recommendations
8
9 374 that summarized the detailed recommendations in a condensed manner (Table 1). We
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11 375 consolidated the 52 specific recommendations into eight overarching recommendations on
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13 376 rehabilitation for older adults living with HIV. These recommendations were endorsed at a final
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15 377 team meeting and provide a broader overview of the evidence synthesis.
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19
20 378 **Table 1- Overarching Evidence-Informed Recommendations in Rehabilitation for Older Adults**
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23 379 **Living with HIV**
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25 380 The following overarching recommendations provide a general guide to providing rehabilitation care,
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27 381 treatment and support with older adults living with HIV.
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32 **Overarching Recommendations in Rehabilitation for Older Adults Living with HIV**
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- 34
35 1. Rehabilitation professionals should be prepared to provide care to older adults with HIV who
36 present with **complex comorbidities** affecting neurological, cardiorespiratory and
37 musculoskeletal systems that may result in physical, mental and social health challenges.
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- 39
40 2. Rehabilitation professionals should adopt an **individualized and interprofessional approach to**
41 **practice** that is sensitive to the **unique values, preferences and needs of older adults with HIV**.
42 This approach should include comprehensive assessment and treatment of **physical,**
43 **neurocognitive and mental health impairments, uncertainty (or worrying about the future),**
44 **functional activity limitations, and social exclusion** while considering the intersections between
45 **personal and social attributes** and the **broader determinants of health**.
46
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- 48
49 3. **Multidisciplinary rehabilitation** including physical therapy, occupational therapy and speech-
50 language pathology is strongly recommended across the **continuum of care** (acute,
51 rehabilitation and community-based care) for older adults with HIV to address the multi-
52 dimensional and episodic nature of disability attributed to HIV and its comorbidities such as
53 bone and joint disorders, cancer, stroke, cardiovascular disease, mental health, cognitive
54 impairment, chronic obstructive pulmonary disease (COPD) and diabetes.
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4. Rehabilitation professionals should consider the role of **extrinsic contextual factors** such as stigma and ageism, HIV disclosure, and emotional and practical social supports on the health and well-being of older adults living with HIV.
5. Rehabilitation professionals should consider the role of **intrinsic contextual factors** such as self-management and spirituality on the health and well-being of older adults living with HIV.
6. A **combination of aerobic and resistive exercise** may be recommended for older adults living with HIV who are medically stable and living with comorbidities including bone and joint disorders, cancer, stroke, cardiovascular disease, stroke, mental health, cognitive impairment, chronic obstructive pulmonary disease (COPD), and diabetes. The frequency, intensity, time and type of exercise should be individually tailored to the specific goals and capacity of the individual and the specific co-morbidity.
7. **Cognitive rehabilitation interventions** (e.g. cognitive training, cognitive stimulation, cognitive rehabilitation) may be recommended for older adults living with HIV with mild cognitive impairment, and stroke. Inconclusive or insufficient evidence exists to support the use of **cognitive behavioural therapy** with older adults with HIV with **depression**. While cognitive rehabilitation does not appear harmful, weak evidence exists to support the use of cognitive-specific interventions to improve spatial neglect, disability, memory, and functional status for older adults who experience stroke. Rehabilitation professionals are encouraged to refer to specific clinical practice guidelines for each health condition to determine the effects of different cognitive interventions for older adults with HIV living with comorbidity.
8. In the absence of high level evidence on rehabilitation interventions for older adults living with HIV and comorbidities, rehabilitation professionals should refer to **existing clinical practice guidelines, systematic reviews, meta-analyses, and other forms of high level evidence for recommendations on interventions for a specific comorbidity**. These recommendations should be applied using an individualized approach incorporating the unique values, preferences, goals and needs of the individual.

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383 DISCUSSION

384 We developed evidence-informed recommendations for rehabilitation with older adults living
385 with HIV using a complex knowledge synthesis of two distinct areas of literature while
386 incorporating PLHIV and clinician preferences throughout. To our knowledge, these are the first

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3 387 evidence-informed recommendations for rehabilitation developed specifically for older adults
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6 388 with HIV.
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9 389 These recommendations may be useful for rehabilitation clinicians who have not
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11 390 worked with PLHIV and HIV specialists unfamiliar with rehabilitation who need an
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13 391 understanding of evidence-informed rehabilitation so that they can make appropriate referrals
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15 392 for their older clients living with HIV. Stream A recommendations were derived from very low
16
17 393 level evidence and result in general statements. Nevertheless, we feel these recommendations
18
19 394 are useful in addressing an overall approach to working with older adults with HIV. The low
20
21 395 level of evidence derived from this area of literature highlights the paucity of evidence specific
22
23 396 to rehabilitation for older adults with HIV and indicates the need for increased work in this
24
25 397 area. While our focus was with older adults with HIV, many of the Stream B recommendations
26
27 398 were derived from evidence not specific to older adults. The wording of our recommendations
28
29 399 depended on how well, or to what extent we could make the 'leap' from the condition-specific
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31 400 evidence to a recommendation for rehabilitation specific to older adults living with HIV and
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33 401 these comorbidities. We included an overview of the prevalence of the comorbidities among
34
35 402 older adults with HIV to assist clinicians in implementing the recommendations among adults
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37 403 with HIV living with comorbidities [30]. The supportive notes that augment the
38
39 404 recommendations were derived primarily from PLHIV and clinician values and preferences to
40
41 405 help situate the recommendation into the context of older adults with HIV. Rehabilitation
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43 406 professionals often tailor treatment strategies to address the consequences of disease
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45 407 (disability) using an individualized goal-setting approach that considers the unique health and
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47 408 social challenges experienced by older adults with HIV. In the absence of high level evidence
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3 409 on rehabilitation interventions specific to older adults with HIV, clinicians may refer to the
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6 410 existing guidelines for the specific comorbidity, and incorporate an individualized approach to
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9 411 assessment and treatment.

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12 412 We chose to present a combination of specific and overarching recommendations to
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14 413 guide rehabilitation for older adults with HIV. Those working with older adults with a specific
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17 414 comorbidity may find the detailed recommendations useful to their practice. Although specific
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20 415 recommendations are more likely to be followed [31], we feel the consolidated (overarching)
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22 416 recommendations may be useful to health providers less familiar working in HIV care and well-
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24 417 suited for knowledge translation to a broader health provider audience and community-based
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27 418 organizations.

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30 419 Overall strengths of our approach included our unique synthesis of two distinct areas of
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33 420 literature combining lower level evidence on emerging issues of HIV and aging with higher level
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36 421 evidence on comorbidities commonly experienced by PLHIV to provide a strong foundation for
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38 422 the development of evidence-informed recommendations. We used a systematic approach to
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41 423 identifying literature, determining inclusion, data extraction, and drafting and refining the
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43 424 recommendations. We drafted the recommendations to include clear actionable and precise
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46 425 terminology, associated with the level of evidence available. We included specific citations
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48 426 from which the recommendation was derived so readers may refer to the original evidence
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51 427 source of the recommendation [32].

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54 428 Our interprofessional and community-integrated approach involving 'expert' older
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56 429 PLHIV and clinicians brought a diverse group of stakeholders together on numerous occasions
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3 430 to engage in the iterative process of recommendation development, review and refinement
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6 431 and ensured the recommendations were practical and relevant to the HIV community. External
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8 432 endorsement further integrated PLHIV and clinician preferences into assessing the feasibility
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10 433 and refinement of recommendations for use in HIV practice [30]. Knowledge, values and
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12 434 experiences of clinicians and PLHIV were integral into the development of the
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16 435 recommendations, particularly when determining the relevance or unique considerations when
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18 436 devising recommendations from evidence derived from other chronic conditions. Our
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21 437 community engaged approach involved PLHIV as members of the core research team, as well as
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23 438 participants in the external endorsement phase. This form of community-academic-clinical
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26 439 research partnership is growing in prominence because it strengthens the potential for
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28 440 effective knowledge transfer and exchange in health research [33].
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32 441 Challenges of this synthesis included combining two areas of research evidence that
33
34 442 differed in quality and context. We chose to retain two parallel but distinct syntheses
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36 443 presented as one collective set of recommendations enabling us to synthesize emerging lower
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39 444 level evidence on HIV aging and rehabilitation with higher level more established evidence in
40
41 445 chronic diseases experienced by older adults with HIV [34]. Much of the evidence from which
42
43 446 these recommendations were derived is from the United States, hence the generalizability of
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45
46 447 these recommendations to other contexts is unknown. The lack of high level Stream A
47
48 448 evidence specific to HIV, aging and rehabilitation resulted in high level considerations when
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51 449 working with older adults with HIV, and emphasize the need for further rehabilitation
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54 450 intervention research specific to older adults with HIV. Disparities emerged among evidence
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57 451 considered weak by GRADE definition, but essential to the values and preferences of PLHIV and
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3 452 clinicians. We were uncertain how to weight the research evidence with PLHIV and clinician
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6 453 values and preferences in order to establish the strength of a given recommendation. We chose
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8
9 454 to remove recommendations for rehabilitation approaches with weak evidence that were not
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11 455 highly endorsed by the majority of team members. Finally, these evidence-informed
12
13 456 recommendations do not specifically address the issue of caregiving, respite and potential
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15
16 457 caregiver burnout, important issues that should be considered by clinicians in the context of
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19 458 HIV and aging [35].

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21
22 459 The development of these recommendations is timely given the changing demographic
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24 460 of adults aging with HIV. These recommendations directly address key research priorities on
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26
27 461 comorbidities and access to rehabilitation identified in a national scoping study of the Canadian
28
29 462 Working Group on HIV and Rehabilitation (CWGHR) [36]. Our recommendations also address
30
31
32 463 key issues related to HIV, rehabilitation and aging that emerged from a national consultation
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34
35 464 with PLHIV, researchers, educators, clinicians, and policy stakeholders by CWGHR including
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37 465 comorbidities experienced by older PLHIV and social determinants of health [37]. These issues
38
39 466 similarly emerged from the external endorsement whereby participants also indicated the
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42 467 importance of end of life care [38], lifestyle modifications including adoption of exercise and
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45 468 yoga [39, 40], and smoking cessation among older adults with HIV [41] as critical to consider in
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47 469 the care and prevention strategies to enhance health for older PLHIV. Moreover, while
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50 470 evidence describes potential benefits of supplements used in osteoarthritis [42], or central
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52 471 nervous stimulants to alleviate HIV-associated cognitive impairments and fatigue [43, 44], the
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54
55 472 focus of these rehabilitation recommendations were non-pharmacological in nature. We
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57 473 developed these recommendations in accordance with the principles outlined by CWGHR for
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3 474 the development of guidelines for rehabilitation in HIV [45]. Merging the traditionally separate
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6 475 areas of rehabilitation, HIV and disability, enabled us to create evidence-informed
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9 476 recommendations that are relevant for rehabilitation in the context of HIV and provide clear
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11 477 actionable recommendations that could direct future practice [45].
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14 478 Limitations of this research included the qualitative nature of the synthesis whereby we
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16
17 479 were unable to pool results from included studies into meta-analyses. Given our approach to
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19
20 480 identify comorbidities, we may have missed other high level evidence on rehabilitation
21
22 481 interventions such as fall prevention or balance training that may not be specific to our pre-
23
24 482 determined comorbidities but may be employed with older adults living with multiple
25
26
27 483 comorbidities. Rehabilitation interventions clinicians use in practice beneficial to older adults
28
29 484 with HIV may not have been captured in this synthesis due to the paucity of HIV and aging
30
31
32 485 literature (Stream A) or due to their lack of high level of evidence (Stream B). Finally, HIV-
33
34 486 specific evidence on rehabilitation for older adults with HIV continues to emerge since we
35
36
37 487 conducted our literature search for included studies in 2011. Recent evidence suggests
38
39 488 cognitive rehabilitation interventions such as computerized speed of processing training and
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41
42 489 self-generation strategies can enhance verbal recall, and cognitive function among older adults
43
44 490 with HIV, and that interventions to promote self-efficacy and social support may enhance
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46
47 491 health-related quality of life among older men with HIV [46-49]. Ongoing revision of the
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49 492 recommendations will be required to reflect the emerging evidence and changing needs of
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52 493 older adults living with HIV.
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3 495 **CONCLUSIONS**

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6 496 We established eight overarching and 52 specific evidence-informed recommendations from a
7
8 497 combination of low level evidence specific to HIV, aging and rehabilitation and high level
9
10 498 research evidence describing the effectiveness of rehabilitation interventions for adults living
11
12 499 with comorbidities experienced by older adults with HIV. PLHIV and clinician values and
13
14 500 preferences were integral in developing these recommendations. Recommendations address
15
16 501 approaches to rehabilitation assessment and interventions, and contextual factors to consider
17
18 502 with rehabilitation of older adults living with HIV. These evidence-informed recommendations
19
20 503 provide a guide for rehabilitation with older PLHIV.
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31 506 **AUTHORS' CONTRIBUTIONS**

32
33 507 KO and PS led the conceptual design of the study, acquisition of funding, conducted the
34
35 508 synthesis, and drafted the manuscript. KO, PS, AMT, DM, and BT reviewed evidence for
36
37 509 inclusion; KO, PS, BT, AMT, and DM extracted data from included studies; KO, AMT, PS, and BT,
38
39 510 conducted the initial methodological quality assessment and primary synthesis; LB, BT, DM, AC,
40
41 511 WC, GR, JW, and TT were involved in the review and GRADING of the recommendations,
42
43 512 analytical interpretations, endorsement, and refinement of the recommendations. JM provided
44
45 513 overall guidance on the synthesis methodology. EZ was the principal knowledge user and
46
47 514 advised on the overall development and process for future translation of the
48
49 515 recommendations. All authors read and approved the final manuscript.
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45

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4

5
6 540 Kelly O'Brien and Patricia Solomon led the conceptual design of the study, acquisition of funding,
7
8 541 conducted the synthesis, and drafted the manuscript. Kelly O'Brien (KO), Patricia Solomon (PS), Anne-
9
10 542 Marie Tynan (AMT), Duncan MacLachlan (DM), and Barry Trentham (BT) reviewed evidence for
11
12 543 inclusion; KO, PS, BT, AMT, and DM extracted data from included studies; KO, AMT, PS, and BT,
13
14 544 conducted the initial methodological quality assessment and primary synthesis; Larry Baxter (LB), BT,
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18 546 (TT) were involved in the review and GRADING of the recommendations, analytical interpretations,
19
20 547 endorsement, and refinement of the recommendations. JM provided overall guidance on the synthesis
21
22 548 methodology. EZ was the principal knowledge user and advised on the overall development and process
23
24 549 for future translation of the recommendations. All authors read and approved the final manuscript.
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29 550 **COMPETING INTERESTS**
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32 551 The authors have no competing interests to declare.
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36 552 **DATA SHARING STATEMENT**
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38 553 No additional data are available.
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3 684 **FIGURE LEGENDS**
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6 685 **Figure 1:** Overview of Knowledge Synthesis Procedure – Classification, Assessing Methodological
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8 686 Quality, Synthesis and Drafting Preliminary Recommendations (Phase 1)
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11 687 **Figure 2:** Overview of Knowledge Synthesis Procedure – Research Team GRADING of
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13 688 Recommendations and Incorporating Values and Preferences (Phase 2)
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16 689 **Figure 3:** Overview of Knowledge Synthesis Procedure – External Endorsement (Phase 3)
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23 692 **DATA SUPPLEMENT FILES (WEB ONLY)**
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26 693 Data Supplement File 1 – External Endorsement Results
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28 694 Data Supplement File 2 - Evidence Informed Recommendations in Rehabilitation for Older
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33 696 Data Supplement File 3 - Characteristics of Included Studies in the Evidence-Informed
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9 | **Developing Evidence-Informed Recommendations in Rehabilitation for Older Adults Living**
10 **with HIV: A Knowledge Synthesis**
11

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Field Code Changed

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34 61
35 62 **Key Words:** HIV/AIDS, aging, rehabilitation, disability, knowledge synthesis, evidence-informed
36 63 recommendations
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40 65 **Word Count:** 4268
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68 **ABSTRACT**

69 **Objective:** Our aim was to develop evidence-informed recommendations in rehabilitation for
70 older adults living with HIV.

71 **Design:** We conducted a knowledge synthesis, combining research evidence specific to HIV,
72 rehabilitation and aging, with evidence on rehabilitation interventions for common
73 comorbidities experienced by older adults with HIV.

74 **Methods:** We included highly relevant HIV-specific research addressing rehabilitation and aging
75 (stream A) and high-quality evidence on the effectiveness of rehabilitation interventions for
76 common comorbidities experienced by older adults aging with HIV (stream B). We extracted
77 and synthesized relevant data from the evidence to draft evidence-informed recommendations
78 on rehabilitation. Draft recommendations were refined based on people living with HIV (PLHIV)
79 and clinician experience, values and preferences, reviewed by an interprofessional team for
80 GRADE (quality) rating and revision, and then circulated to PLHIV and clinicians for external
81 endorsement and final refinement. We then devised overarching recommendations to broadly
82 guide rehabilitation for older PLHIV.

83 **Results:** This synthesis yielded eight overarching and 52 specific recommendations. Thirty-six
84 specific recommendations were derived from 108 moderate or high level research articles
85 (meta-analyses and systematic reviews) that described the effectiveness of rehabilitation
86 interventions for comorbidities that may be experienced by older adults with HIV.
87 Recommendations addressed rehabilitation interventions across eight health conditions: bone
88 and joint disorders, cancer, stroke, cardiovascular disease, mental health challenges, cognitive
89 impairments, chronic obstructive pulmonary disease, and diabetes. Sixteen specific

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9 90 recommendations were derived from 42 research articles specific to rehabilitation for older
10 91 adults with HIV. The quality of evidence from which these recommendations were derived was
11 92 either low or very low, consisting primarily of narrative reviews or descriptive studies with small
12 93 sample sizes. Recommendations addressed approaches to rehabilitation assessment and
13 94 interventions, and contextual factors to consider with rehabilitation of older adults living with
14 95 HIV.
15 96 **Conclusions:** These evidence-informed recommendations provide a guide for rehabilitation
16 97 with older adults with HIV.

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98 Strengths and Limitations of this Study

- 99 ▪ We developed evidence-informed recommendations for rehabilitation with older adults
100 living with HIV using a complex knowledge synthesis of two distinct areas of literature
101 while incorporating people living with HIV and clinician preferences throughout.
- 102 ▪ Fifty-two recommendations were developed.
 - 103 ○ Thirty-six specific recommendations were derived from 108 moderate or high level
104 research articles that described the effectiveness of rehabilitation interventions for
105 comorbidities that may be experienced by older adults with HIV. Recommendations
106 addressed rehabilitation interventions across eight health conditions commonly
107 experienced by older adults with HIV.
 - 108 ○ Sixteen specific recommendations were derived from 42 research articles specific to
109 rehabilitation for older adults with HIV.
- 110 ▪ To our knowledge, these are the first evidence-informed recommendations for
111 rehabilitation developed specifically for older adults living with HIV.
- 112 ▪ Recommendations address approaches to rehabilitation assessment and interventions, and
113 contextual factors to consider with rehabilitation of older adults living with HIV.

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9 117 **INTRODUCTION**

10 118 As adults age with HIV, more individuals are living with the physical, social and psychological
11 119 consequences of the disease, long term treatment, and comorbidities associated with aging [1-
12 120 4]. For many, HIV is experienced as a chronic illness whereby individuals experience a range of
13 121 health-related challenges known as *disability*, including symptoms and impairments (e.g.
14 122 fatigue, weakness, pain), difficulties with day-to-day activities (e.g. household chores),
15 123 challenges to social inclusion (e.g. ability to work) and uncertainty or worrying about future
16 124 health as they age [5-7]. Premature onset of cardiovascular disease [8], diabetes [8], bone and
17 125 joint disorders [9], neurocognitive disorders [10] and non-AIDS-defining cancers [11] further
18 126 add to the complexity of disability aging with HIV [12-16]. Rehabilitation has become an
19 127 increasingly important strategy to address disability experienced by adults aging with HIV and
20 128 specifically older adults living with comorbidities [17].

21 129 *Rehabilitation* is broadly defined as any service or health provider that may address or
22 130 prevent impairments, activity limitations or social participation restrictions experienced by an
23 131 individual [17]. Rehabilitation assists in managing the health-related challenges or disability
24 132 associated with HIV such as adverse effects of medications, fatigue, pain, neuropathy, mental
25 133 health problems, cognitive problems and issues related to income and vocational support.

26 134 Rehabilitation approaches such as physical therapy and occupational therapy are well
27 135 established in complex chronic disease management and are associated with improvements in
28 136 health outcomes in cardiovascular disease [18], stroke [19], and cancer [20]. However,
29 137 rehabilitation in the context of HIV is still emerging. Few rehabilitation professionals work with
30 138 people living with HIV (PLHIV) highlighting a gap in service provision and need for further HIV

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9 139 knowledge, training and clinical guidance [21]. Evidence-informed guidelines are essential to
10 140 enhance awareness among clinicians, researchers, educators, and PLHIV and to optimize HIV
11 141 rehabilitation for older adults with HIV.

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16 142 No known guidelines specific to HIV rehabilitation and aging exist. Developing evidence-
17 143 informed recommendations in an emerging area of practice is challenging when high levels of
18 144 evidence in the form of systematic reviews and meta-analyses are often not available. Such is
19 145 the case with HIV, which has transitioned from an acute fatal illness to a chronic condition since
20 146 the advent of combination antiretroviral therapies [became available in developed countries](#) in
21 147 the mid-1990s. Combining lower level evidence on emerging issues of HIV and aging with
22 148 higher level evidence on rehabilitation interventions for other health conditions experienced by
23 149 older adults with HIV can provide a strong foundation for the development of evidence-
24 150 informed recommendations. Our aim was to develop evidence-informed recommendations in
25 151 rehabilitation for older adults living with HIV.

36 152 **METHODS**

37 153 We conducted a knowledge synthesis combining two streams of evidence: A) highly relevant
38 154 HIV-specific evidence addressing rehabilitation and aging and B) high quality evidence on the
39 155 effectiveness of **non-pharmacologic rehabilitation interventions** for comorbidities commonly
40 156 experienced by older adults aging with HIV. Synthesizing this evidence allowed us to consider
41 157 emerging literature specific to HIV and aging while taking advantage of existing high level
42 158 evidence on interventions for common conditions experienced by older adults and customizing
43 159 it to older adults with HIV.

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9 160 This research was led by an interdisciplinary team of researchers, educators, health
10 161 providers with expertise in HIV, aging, and rehabilitation and PLHIV with lived experience of
11 162 aging with HIV. The team engaged in all aspects of this study including the identification,
12 163 appraisal and synthesis of the literature, and development and refinement of the evidence-
13 164 informed recommendations. We incorporated PLHIV values and preferences and clinical
14 165 expertise throughout [22]. This research received Research Ethics Board approval from
15 166 McMaster University, Hamilton, Ontario, Canada.

167 **Searching and Identifying the Literature and Data Extraction**

168 *Stream A) Evidence specific to HIV, aging and rehabilitation*

169 We conducted a synthesis of published literature specific to HIV, aging and rehabilitation. We
170 searched electronic databases including MEDLINE, CINAHL, EMBASE, PsycINFO, from 1980 to
171 December 2010. Search terms included: HIV, aging, and rehabilitation and were altered
172 depending on the database. We included studies that addressed issues related to HIV, aging
173 (older adults 50 years and older) and rehabilitation, and were published in the English language.
174 We defined 'rehabilitation' as any **non-pharmacological services**, interventions, or providers
175 who address or prevent impairments, activity limitations and social participation restrictions
176 experienced by an individual [17]. Given this is an emerging area of literature; all study designs,
177 including narrative reviews were included.

178 *Stream B) High level evidence on rehabilitation interventions specific to comorbidities that may*
179 *be experienced by older adults living with HIV*

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9 180 We searched for high-quality evidence (systematic reviews and meta-analyses) on the
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11 181 effectiveness of non-pharmacologic rehabilitation interventions for comorbidities that may be
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13 182 experienced by older adults aging with HIV. We searched electronic databases including
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15 183 MEDLINE, CINAHL, EMBASE, PsycINFO, the Cochrane Database of Systematic Reviews, and the
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17 184 National Guideline Clearinghouse from 1980 to August 2011 for systematic reviews and meta-
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19 185 analyses related to common comorbidities. We included systematic reviews or meta-analyses
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21 186 that addressed one or more comorbidities experienced by adults living with HIV which included
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23 187 but were not limited to: bone and joint disorders, cancer, cardiovascular disease, mental
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25 188 health, neurocognitive decline, cardiopulmonary disease, diabetes and were published in
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27 189 English.

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30 190 Five individuals independently reviewed abstracts from Stream A and B evidence to
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32 191 determine their eligibility for inclusion. Where disagreements occurred, the full text was
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34 192 retrieved and a third reviewer determined final inclusion [23]. Two individuals independently
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36 193 reviewed full articles for inclusion. In situations of disagreement reviewers discussed articles to
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38 194 reach consensus on final inclusion. Five individuals independently extracted data from the final
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40 195 group of included evidence onto a data charting form. Data extracted from Stream A evidence
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42 196 included author, year, study location, study purpose, study design, intervention type and
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44 197 comparison group if any, details of the intervention, study populations, sample size, outcome
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46 198 measures, key results, authors' overall conclusions, and reviewers' interpretations of important
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48 199 considerations and recommendations for HIV rehabilitation and aging. Data extracted from
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50 200 Stream B evidence included author, year, study purpose, study design (systematic review or
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52 201 meta-analysis), characteristics of participants, number of included studies, sample size,
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9 202 intervention(s) and comparison group (if any), frequency, intensity, time and type of each
10 203 intervention, outcome measures, key results, overall author conclusions, and reviewers'
11 204 interpretations of considerations for developing evidence-based recommendations for older
12 205 adults living with HIV.

17 206 **Development of the Recommendations**

19 207 We developed the evidence-informed recommendations using a three-phase iterative process
20 208 involving 1) classification, grading methodological quality, synthesis of the evidence, and
21 209 drafting the preliminary recommendations, 2) interprofessional team review, grading and
22 210 revision of recommendations incorporating values and preferences, and 3) external
23 211 endorsement and final refinement.

30 212 **PHASE 1 - Classification, Grading Methodological Quality, Synthesis and Drafting the**

32 213 **Preliminary Recommendations (Figure 1)**

34 214 Our search yielded a total of 6664 independent citations (2512 from stream A and 4152 from
35 215 stream B), of which 165 studies (50 studies from Stream A, and 115 studies for Stream B) met
36 216 our inclusion criteria. Overall, our Phase 1 synthesis yielded 25 recommendations from Stream
37 217 A evidence, and 49 recommendations from Stream B evidence for a total of 74 preliminary
38 218 recommendations.

45 219 **Stream A - Evidence specific to HIV, rehabilitation and aging**

47 220 We classified the evidence (n=50 studies) based on 11 concepts to draft the preliminary
48 221 recommendations ranging from overarching principles for rehabilitation with older adults living
49 222 with HIV to interventions (Figure 1). We then assessed the methodological quality of each

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223 included article and the quality of the collective group of evidence from each of the 11 key
224 concepts used to draft each recommendation using GRADE methodological quality criteria [24-
225 28]. Two authors knowledgeable in HIV, aging and rehabilitation (AMT, KO) independently
226 synthesized the extracted data using directed content analysis techniques [29] and formulated
227 key themes surrounding rehabilitation assessment and treatment that informed the
228 recommendations. One author (KO) then drafted 25 preliminary recommendations by
229 synthesizing results and conclusions from each collective group of evidence. Subsequently, two
230 authors (PS, KO) met to review the accuracy of the content analysis and collectively agreed on
231 preliminary evidence-informed recommendations specific to HIV, aging and rehabilitation.

232 *Stream B - High level evidence on rehabilitation interventions for common comorbidities*

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233 We grouped Stream B evidence by comorbidity experienced by older adults living with HIV,
234 followed by the respective intervention. We classified the evidence based on 11 areas (bone
235 and joint disorders; cancer; stroke; cardiovascular disease (CVD); mental health challenges;
236 cognitive impairments; Parkinson's Disease; chronic obstructive pulmonary disease (COPD);
237 diabetes; older adults; HIV) (Figure 1). We assessed the methodological quality of each article,
238 and the quality of evidence from each collective area of focus used to draft each
239 recommendation using the GRADE criteria [24-28]. Two authors (KO, AMT) independently
240 synthesized the recommendations from the meta-analyses and systematic reviews using
241 directed content analysis techniques [29] surrounding assessment, treatment intervention,
242 intensity, progression of intensity, and health outcomes for each comorbidity. One author (KO)
243 then drafted a total of 49 preliminary recommendations from the 115 included articles by
244 synthesizing each collective group of study results and overall conclusions. Two authors (KO, PS)

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9 245 met to review the accuracy of the synthesis to collectively determine preliminary evidence-
10 246 informed recommendations for each of the comorbidities. The resulting 49 recommendations
11 247 for Stream B spanned 11 areas of focus: bone and joint disorders (6 recommendations); cancer
12 248 (8); stroke (12); CVD (7); mental health challenges (4); cognitive impairments (3); Parkinson's
13 249 disease (1); COPD (4); diabetes (1); older adults (2); and HIV (1).

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20 250 **PHASE 2 – Research Team GRADING of Recommendations and Incorporating Values and**
21 251 **Preferences among PLHIV and Clinicians (Figure 2)**

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24 252 We circulated the 74 preliminary recommendations to researchers, PLHIV and clinicians on the
25 253 synthesis team in order to obtain GRADE ratings for the recommendations and incorporate
26 254 individual experiences, values and preferences. For each recommendation, the team member
27 255 indicated the GRADE rating incorporating both quality of the evidence and the extent to which
28 256 the recommendation was applicable to older adults living with HIV. GRADE rating at this stage
29 257 included four levels [24-28]: **High** – fully endorse or strongly recommended. This
30 258 recommendation would be appropriate for the majority of older adults living with HIV,
31 259 suggested wording of the recommendation would include; 'we should or should not do';
32 260 **Moderate** – moderately endorse or recommend. This recommendation would be applicable to
33 261 some older adults with HIV; **Low** - minimally endorse or weak recommendation. This
34 262 recommendation would be applicable to a few older adults with HIV, with potential variability
35 263 in values and preferences. Wording of this recommendation would include; 'we suggest, may
36 264 recommend or may not recommend'; or **Very low** - do not endorse or do not recommend at all.
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50 265 This recommendation would not be appropriate for older adults living with HIV.
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9 266 This phase of GRADE rating required a trade-off between benefits and drawbacks, and
10 267 values and principles of the PLHIV, clinician or researcher. Team members were asked to
11 268 comment on their values and preferences related to the recommendation and how these
12 269 influenced their rating. Team members also suggested revisions or refinement to the
13 270 recommendation.

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20 271 Collectively the evidence specific to HIV aging and rehabilitation (Stream A) was low to
21 272 very low quality as much of the evidence consisted of cross-sectional qualitative or quantitative
22 273 studies (with no comparison group) or narrative reviews. No [randomized-controlled trials](#)
23 274 [\(RCTs\)](#) were included. Clinicians and PLHIV on the team incorporated their clinical expertise and
24 275 experience, values and preferences, respectively, when determining their final GRADE rating.
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29 276 For Stream B given only systematic reviews or meta-analyses were included, the rating of the
30 277 evidence was either very high or high. However, the GRADING of the recommendation
31 278 depended on the extent to which the team felt the evidence was applicable to older adults with
32 279 HIV and if the intervention posed minimal risk or harm to those living with HIV and these
33 280 comorbidities.

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9 281 **Phase 2 GRADE Results**

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11 282 The research team met twice to discuss the overall GRADE results, and recommendations for
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13 283 revision (Research Team Meetings #2 and #3). In the latter meeting we summarized and
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15 284 incorporated values and preferences of PLHIV and clinicians into the recommendations (Figure
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17 285 2).

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20 286 *Stream A - GRADE RATING RESULTS and REVISION*

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23 287 We consolidated similar or overlapping recommendations and deleted those not highly
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25 288 endorsed by the majority of the team. We also removed recommendations to specific
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27 289 interventions with inconclusive evidence because of team concerns of endorsing specific
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29 290 interventions over others under-reported in the research evidence.

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32 291 Overall this process resulted in the deletion of eight articles. The remaining 42 articles
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34 292 in Stream A yielded 16 evidence-informed recommendations for older adults with HIV that
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36 293 spanned three themes: 1) implications for future education of rehabilitation professionals (1
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38 294 recommendation); 2) approaches to rehabilitation assessment and treatment (14
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40 295 recommendations); and 3) interventions (1 recommendation) (Figure 2).

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42 296 *Stream B - GRADE RATING RESULTS and REVISION*

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45 297 Based on the GRADE rating of team members and our meeting discussions we revised the
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47 298 Stream B recommendations. We deleted recommendations that were not endorsed by the
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49 299 clinicians and PLHIV and recommendations that referred to conditions not common to HIV and
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51 300 aging. Overall this process resulted in the removal of 6 articles. The remaining 109 articles in

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9 301 Stream B yielded 40 evidence-informed recommendations that spanned the 10 areas: bone and
10 302 joint disorders, cancer (general, lung and metastatic cancer), stroke, CVD (myocardial infarction,
11 303 heart disease, heart failure), mental health challenges, cognitive impairment, COPD, diabetes,
12 304 older adults and HIV/AIDS (Figure 2). Recommendations spanned interventions including
13 305 exercise, rehabilitation, self-management, cognitive rehabilitation, pulmonary rehabilitation,
14 306 electrotherapeutic modalities, cardiac rehabilitation, inspiratory muscle training,
15 307 psychotherapy, models of care, and housing models.

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24 308 **PHASE 3 - EXTERNAL ENDORSEMENT- Incorporating 'expert knowledge' from clinicians and**
25 309 **adults living with HIV (Figure 3)**

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28 310 We circulated the recommendations electronically to a broader group of 38 clinicians and PLHIV
29 311 for external endorsement using an online survey. We asked participants whether they
30 312 endorsed, did not endorse, or had no opinion about each recommendation. Participants were
31 313 also invited to provide comments. We considered endorsement rates of >80%, 60-80%, and
32 314 <60% as high, moderate and low levels of endorsement, respectively. Responses from this
33 315 endorsement phase were incorporated into the final revision and refinement of the evidence-
34 316 informed recommendations (Figure 3).

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43 317 **External Endorsement Results:** Of the 38 PLHIV and clinicians invited to participate in the online
44 318 endorsement survey, 19 (50%) completed the online survey. Of the 19 individuals who
45 319 completed the endorsement survey, 9 (47%) were health professionals, 8 (42%) were PLHIV and
46 320 2 (11%) were both a health professional and PLHIV. Health professionals included physicians

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9 321 (geriatrics and infectious diseases) (27%), occupational therapists (27%), speech-language
10 322 pathologists (27%) and social workers (18%).

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12 323 Rates of endorsement for each recommendation ranged from 47% (9/19 participants) to
13 324 100% (19/19 participants). The number of participants who viewed the citations from which
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15 325 the recommendations were derived ranged from three (16%) to 10 participants (53%).
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17 326 Participants tended to highly endorse recommendations in Stream A and those in Stream B
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19 327 related to exercise. Recommendations related to inconclusive evidence had lower rates of
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21 328 endorsement. Endorsement participants highlighted how recommendations could be
22
23 329 applicable to any population (not just older adults with HIV). Others recommended highlighting
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25 330 other interventions not captured in the recommendations, such as yoga or tai-chi. See Data
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27 331 Supplement File 1 for an overview of the endorsement results.

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29 332 Two recommendations endorsed by <60% of participants were removed. The team
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31 333 further synthesized the final 52 specific recommendations into eight overarching
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33 334 recommendations on rehabilitation for older adults living with HIV. See Data Supplement File
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35 335 2 for the **f**Final **e**Evidence-**i**nformed **r**Recommendations and Data Supplement File 3 for
36
37 336 characteristics of included studies in the final recommendations.

38 39 337 **Final Recommendations**

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41 338 Results of this synthesis are presented across two streams that represent the two different
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43 339 bodies of research evidence totaling 52 specific recommendations (Data Supplement File 2).
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45 340 We also present overarching recommendations derived from the specific detailed evidence-
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47 341 informed recommendations on rehabilitation for older adults living with HIV (Table 1).
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9 342 *Specific (Detailed) Recommendations*

10 343 Stream A results include 16 recommendations derived from 42 research evidence articles
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12 344 specific to rehabilitation for older adults living with HIV. The level of evidence from which these
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14 345 recommendations were derived was either low or very low, meaning the articles were mostly
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16 346 narrative review articles or descriptive studies (either qualitative or quantitative) with small
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18 347 sample sizes. Although the studies were low level evidence, the PLHIV and clinician
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20 348 endorsements indicated that these were of fundamental importance in management of
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22 349 disability in older adults living with HIV. Stream A recommendations serve as the contextual
23
24 350 backdrop to providing rehabilitation care, treatment and support to older adults living with HIV.
25
26 351 Some of the recommendations have additional explanatory notes to further explain the context
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28 352 and PLHIV and clinician values (Data Supplement File 2). The recommendations are organized
29
30 353 into six categories: A) preparedness of rehabilitation professionals; B) approaches to
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32 354 rehabilitation assessment and treatment of older adults living with HIV; C) extrinsic factors to
33
34 355 consider with rehabilitation of older adults living with HIV; D) intrinsic factors to consider with
35
36 356 rehabilitation of older adults living with HIV; E) rehabilitation approaches; and F) rehabilitation
37
38 357 interventions (Data Supplement File 2).

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41 358 | Stream B results include 36 recommendations derived from 108 moderate or high level
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43 359 research evidence articles describing the effectiveness of rehabilitation interventions for adults
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45 360 living with health conditions and include specific considerations when applying rehabilitation
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47 361 interventions for older PLHIV (Figure 3). Stream B recommendations include an overview of
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49 362 the prevalence of the condition among older adults with HIV, main health-related challenges
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51 363 for older adults with HIV experiencing this condition from a rehabilitation perspective, study
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9 364 citations and level of evidence from which the recommendation was derived, age of
10 365 participants included in the evidence (not all high level rehabilitation intervention evidence was
11 366 specific to older adults). The recommendations include specific considerations for older adults
12 367 with HIV. The recommendations are presented based on interventions across A) older adults, B)
13 368 HIV/AIDS, and eight common comorbidities that may be experienced by older adults with HIV;
14 369 C) bone and joint disorders, D) cancer, E) stroke, F) cardiovascular disease, G) mental health
15 370 challenges, H) cognitive impairments, I) COPD and J) diabetes (Data Supplement File 2).

23 371 *Overarching Recommendations*

24 372 To facilitate knowledge transfer and exchange, we established overarching recommendations
25 373 that summarized the detailed recommendations in a condensed manner (Table 1). We
26 374 consolidated the 52 specific recommendations into eight overarching recommendations on
27 375 rehabilitation for older adults living with HIV. These recommendations were endorsed at a final
28 376 team meeting and provide a broader overview of the evidence synthesis.

37 377 **Table 1- Overarching Evidence-Informed Recommendations in Rehabilitation for Older Adults**

38 378 **Living with HIV**

39 379 The following overarching recommendations provide a general guide to providing rehabilitation care,
40 380 treatment and support with older adults living with HIV.

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Overarching Recommendations in Rehabilitation for Older Adults Living with HIV

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1. Rehabilitation professionals should be prepared to provide care to older adults with HIV who present with **complex comorbidities** affecting neurological, cardiorespiratory and musculoskeletal systems that may result in physical, mental and social health challenges.
2. Rehabilitation professionals should adopt an **individualized and interprofessional approach to practice** that is sensitive to the **unique values, preferences and needs of older adults with HIV**. This approach should include comprehensive assessment and treatment of **physical, neurocognitive and mental health impairments, uncertainty (or worrying about the future), functional activity limitations, and social exclusion** while considering the intersections between **personal and social attributes** and the **broader determinants of health**.
3. **Multidisciplinary rehabilitation** including physical therapy, occupational therapy and speech-language pathology is strongly recommended across the **continuum of care** (acute, rehabilitation and community-based care) for older adults with HIV to address the multi-dimensional and episodic nature of disability attributed to HIV and its comorbidities such as bone and joint disorders, cancer, stroke, cardiovascular disease, mental health, cognitive impairment, chronic obstructive pulmonary disease (COPD) and diabetes.
4. Rehabilitation professionals should consider the role of **extrinsic contextual factors** such as stigma and ageism, HIV disclosure, and emotional and practical social supports on the health and well-being of older adults living with HIV.
5. Rehabilitation professionals should consider the role of **intrinsic contextual factors** such as self-management and spirituality on the health and well-being of older adults living with HIV.
6. A **combination of aerobic and resistive exercise** may be recommended for older adults living with HIV who are medically stable and living with comorbidities including bone and joint disorders, cancer, stroke, cardiovascular disease, stroke, mental health, cognitive impairment, chronic obstructive pulmonary disease (COPD), and diabetes. The frequency, intensity, time and type of exercise should be individually tailored to the specific goals and capacity of the individual and the specific co-morbidity.
7. **Cognitive rehabilitation interventions** (e.g. cognitive training, cognitive stimulation, cognitive rehabilitation) may be recommended for older adults living with HIV with mild cognitive impairment, and stroke. Inconclusive or insufficient evidence exists to support the use of **cognitive behavioural therapy** with older adults with HIV with **depression**. While cognitive rehabilitation does not appear harmful, weak evidence exists to support the use of cognitive-specific interventions to improve spatial neglect, disability, memory, and functional status for

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older adults who experience stroke. Rehabilitation professionals are encouraged to refer to specific clinical practice guidelines for each health condition to determine the effects of different cognitive interventions for older adults with HIV living with comorbidity.

8. In the absence of high level evidence on rehabilitation interventions for older adults living with HIV and comorbidities, rehabilitation professionals should refer to **existing clinical practice guidelines, systematic reviews, meta-analyses, and other forms of high level evidence for recommendations on interventions for a specific comorbidity**. These recommendations should be applied using an individualized approach incorporating the unique values, preferences, goals and needs of the individual.

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383 DISCUSSION

384 We developed evidence-informed recommendations for rehabilitation with older adults living
385 with HIV using a complex knowledge synthesis of two distinct areas of literature while
386 incorporating PLHIV and clinician preferences throughout. To our knowledge, these are the first
387 evidence-informed recommendations for rehabilitation developed specifically for older adults
388 with HIV.

389 These recommendations may be useful for rehabilitation clinicians who have not
390 worked with PLHIV and HIV specialists unfamiliar with rehabilitation who need an
391 understanding of evidence-informed rehabilitation so that they can make appropriate referrals
392 for their older clients living with HIV. Stream A recommendations were derived from very low
393 level evidence and result in general statements. Nevertheless, we feel these recommendations
394 are useful in addressing an overall approach to working with older adults with HIV. The low
395 level of evidence derived from this area of literature highlights the paucity of evidence specific
396 to rehabilitation for older adults with HIV and indicates the need for increased work in this
397 area. While our focus was with older adults with HIV, many of the Stream B recommendations

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398 were derived from evidence not specific to older adults. The wording of our recommendations
399 depended on how well, or to what extent we could make the 'leap' from the condition-specific
400 evidence to a recommendation for rehabilitation specific to older adults living with HIV ~~with~~
401 ~~and~~ these comorbidities. We included an overview of the prevalence of the comorbidities
402 among older adults with HIV to assist clinicians in implementing the recommendations among
403 adults with HIV living with comorbidities [30]. The supportive notes that augment the
404 recommendations were derived primarily from PLHIV and clinician values and preferences to
405 help ~~to~~ situate the recommendation into the context of older adults with HIV. Rehabilitation
406 professionals often tailor treatment strategies to address the consequences of disease
407 (disability) ~~framed with using goal setting, and~~ an individualized ~~goal setting~~ approach
408 ~~considering that considers~~ the unique health and social challenges experienced by older adults
409 with HIV. In the absence of high level evidence on rehabilitation interventions specific to older
410 adults with HIV, clinicians may refer to the existing guidelines for the specific comorbidity, and
411 incorporate an individualized approach to assessment and treatment.

412 We chose to present a combination of specific and overarching recommendations to
413 guide rehabilitation for older adults with HIV. Those working with older adults with a specific
414 comorbidity may find the detailed recommendations useful to their practice. Although specific
415 recommendations are more likely to be followed [31], we feel the consolidated (overarching)
416 recommendations may be useful to health providers less familiar working in HIV care and well-
417 suited for knowledge translation to a broader health provider audience and community-based
418 organizations.

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9 419 Overall strengths of our approach included our unique synthesis of two distinct areas of
10 420 literature combining lower level evidence on emerging issues of HIV and aging with higher level
11 421 evidence on comorbidities commonly experienced by PLHIV to provide a strong foundation for
12 422 the development of evidence-informed recommendations. We used a systematic approach to
13 423 identifying literature, determining inclusion, data extraction, and drafting and refining the
14 424 recommendations. We drafted the recommendations to include clear actionable and precise
15 425 terminology, associated with the level of evidence available. We included specific citations
16 426 from which the recommendation was derived so readers may refer to the original evidence
17 427 source of the recommendation [32].
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28 428 Our interprofessional and community-integrated approach involving 'expert' older
29 429 PLHIV and clinicians brought a diverse group of stakeholders together on numerous occasions
30 430 to engage in the iterative process of recommendation development, review and refinement
31 431 and ensured the recommendations were practical and relevant to the HIV community. External
32 432 endorsement further integrated PLHIV and clinician preferences into assessing the feasibility
33 433 and refinement of recommendations for use in HIV practice [30]. Knowledge, values and
34 434 experiences of clinicians and PLHIV were integral into the development of the
35 435 recommendations, particularly when determining the relevance or unique considerations when
36 436 devising recommendations from evidence derived from other chronic conditions. **Our**
37 437 **community engaged approach involved PLHIV as members of the core research team, as well as**
38 438 **participants in the external endorsement phase. This form of community-academic-clinical**
39 439 **research partnership is of growing in prominence and strength of our approach as because it**
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9 440 strengthens the potential for effective knowledge transfer and exchange becomes central to
10 health research [33].

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14 442 Challenges of this synthesis included combining two areas of research evidence that
15 443 differed in quality and context. We chose to retain two parallel but distinct syntheses
16 444 presented as one collective set of recommendations enabling us to synthesize emerging lower
17 445 level evidence on HIV aging and rehabilitation with higher level more established evidence in
18 446 chronic diseases experienced by older adults with HIV [34]. Much of the evidence from which
19 447 these recommendations were derived is from the United States, hence the generalizability of
20 448 these recommendations to other contexts is unknown. The lack of high level Stream A
21 449 evidence specific to HIV, aging and rehabilitation resulted in high level considerations when
22 450 working with older adults with HIV, and emphasize the need for further rehabilitation
23 451 intervention research specific to older adults with HIV. Disparities emerged among evidence
24 452 considered weak by GRADE definition, but essential to the values and preferences of PLHIV and
25 453 clinicians. We were uncertain how to weight the research evidence with PLHIV and clinician
26 454 values and preferences in order to establish the strength of a given recommendation. We chose
27 455 to remove recommendations for rehabilitation approaches with weak evidence that were not
28 456 highly endorsed by the majority of team members. Finally, these evidence-informed
29 457 recommendations do not specifically address the issue of caregiving, respite and potential
30 458 caregiver burnout, important issues that should be considered by clinicians in the context of
31 459 HIV and aging [35].
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9 460 The development of these recommendations is timely given the changing demographic
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11 461 of adults aging with HIV. These recommendations directly address key research priorities on
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13 462 comorbidities and access to rehabilitation identified in a national scoping study of the Canadian
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15 463 Working Group on HIV and Rehabilitation (CWGHR) [36]. Our recommendations also address
16
17 464 key issues related to HIV, rehabilitation and aging that emerged from a national consultation
18
19 465 with PLHIV, researchers, educators, clinicians, and policy stakeholders by CWGHR including
20
21 466 comorbidities experienced by older PLHIV and social determinants of health [37]. These issues
22
23 467 similarly emerged from the external endorsement whereby participants also indicated the
24
25 468 importance of end of life care [38], lifestyle modifications including adoption of exercise and
26
27 469 yoga [39, 40], and smoking cessation among older adults with HIV [41] as critical to consider in
28
29 470 the care and prevention strategies to enhance health for older PLHIV. Moreover, while
30
31 471 evidence describes potential benefits of supplements used in osteoarthritis [42], or central
32
33 472 nervous stimulants to alleviate HIV-associated cognitive impairments and fatigue [43, 44], the
34
35 473 focus of these rehabilitation recommendations were non-pharmacological in nature. We
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37 474 developed these recommendations in accordance with the principles outlined by CWGHR for
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39 475 the development of guidelines for rehabilitation in HIV [45]. Merging the traditionally separate
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41 476 areas of rehabilitation, HIV and disability, enabled us to create evidence-informed
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43 477 recommendations that are relevant for rehabilitation in the context of HIV and provide clear
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45 478 actionable recommendations that could direct future practice [45].

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48 479 Limitations of this research included the qualitative nature of the synthesis whereby we
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50 480 were unable to pool results from included studies into meta-analyses. Given our approach to
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52 481 identify comorbidities, we may have missed other high level evidence on rehabilitation

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9 482 interventions such as fall prevention or balance training that may not be specific to our pre-
10 483 determined comorbidities but may be employed with older adults living with multiple
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12 484 comorbidities. Rehabilitation interventions clinicians use in practice beneficial to older adults
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15 485 with HIV may not have been captured in this synthesis due to the paucity of HIV and aging
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17 486 literature (Stream A) or due to their lack of high level of evidence (Stream B). **Finally, HIV-**
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19 487 **specific evidence on rehabilitation for older adults with HIV continues to emerge since we**
20
21 488 **conducted our literature search for included studies in 2011.- Recent evidence suggests**
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23 489 **cognitive rehabilitation interventions such as computerized speed of processing training and**
24
25 490 **self-generation strategies can enhance verbal recall, and cognitive function among older adults**
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27 491 **with HIV, and that interventions to promote self-efficacy and social support may enhance**
28
29 492 **health-related quality of life among older men with HIV [46-49].** Ongoing revision of the
30
31 493 recommendations will be required to reflect the emerging evidence and changing needs of
32
33 494 older adults living with HIV.

495 CONCLUSIONS

37 496 We established eight overarching and 52 specific evidence-informed recommendations from a
38
39 497 combination of low level evidence specific to HIV, aging and rehabilitation and high level
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41 498 research evidence describing the effectiveness of rehabilitation interventions for adults living
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43 499 with comorbidities experienced by older adults with HIV. PLHIV and clinician values and
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45 500 preferences were integral in developing these recommendations. Recommendations address
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47 501 approaches to rehabilitation assessment and interventions, and contextual factors to consider
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49 502 with rehabilitation of older adults living with HIV. These evidence-informed recommendations
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51 503 provide a guide for rehabilitation with older PLHIV.

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9 50410 505 **AUTHORS' CONTRIBUTIONS**

11 506 KO and PS led the conceptual design of the study, acquisition of funding, conducted the
12 507 synthesis, and drafted the manuscript. KO, PS, AMT, DM, and BT reviewed evidence for
13 508 inclusion; KO, PS, BT, AMT, and DM extracted data from included studies; KO, AMT, PS, and BT,
14 509 conducted the initial methodological quality assessment and primary synthesis; LB, BT, DM, AC,
15 510 WC, GR, JW, and TT were involved in the review and GRADING of the recommendations,
16 511 analytical interpretations, endorsement, and refinement of the recommendations. JM provided
17 512 overall guidance on the synthesis methodology. EZ was the principal knowledge user and
18 513 advised on the overall development and process for future translation of the
19 514 recommendations. All authors read and approved the final manuscript.

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21 531 (Department of Psychiatry, University of Toronto), and Murray Jose (Toronto People With AIDS
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23 532 Foundation).

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26 27 534 **COMPETING INTERESTS**

28
29 535 The authors have no competing interests to declare.
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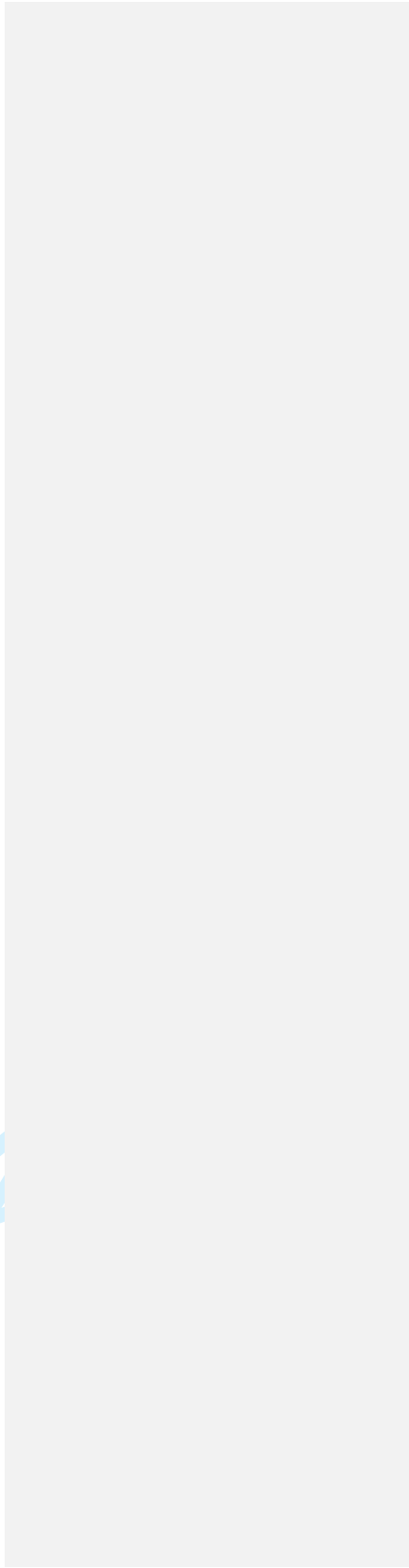
46 47 544 **DATA SUPPLEMENT FILES (WEB ONLY)**

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49 545 Data Supplement File 1 – External Endorsement Results
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- 546 Data Supplement File 2 - Evidence Informed Recommendations in Rehabilitation for Older
- 547 Adults Living with HIV
- 548 Data Supplement File 3 - Characteristics of Included Studies in the Evidence-Informed
- 549 Recommendations in Rehabilitation for Older Adults Living with HIV

For peer review only



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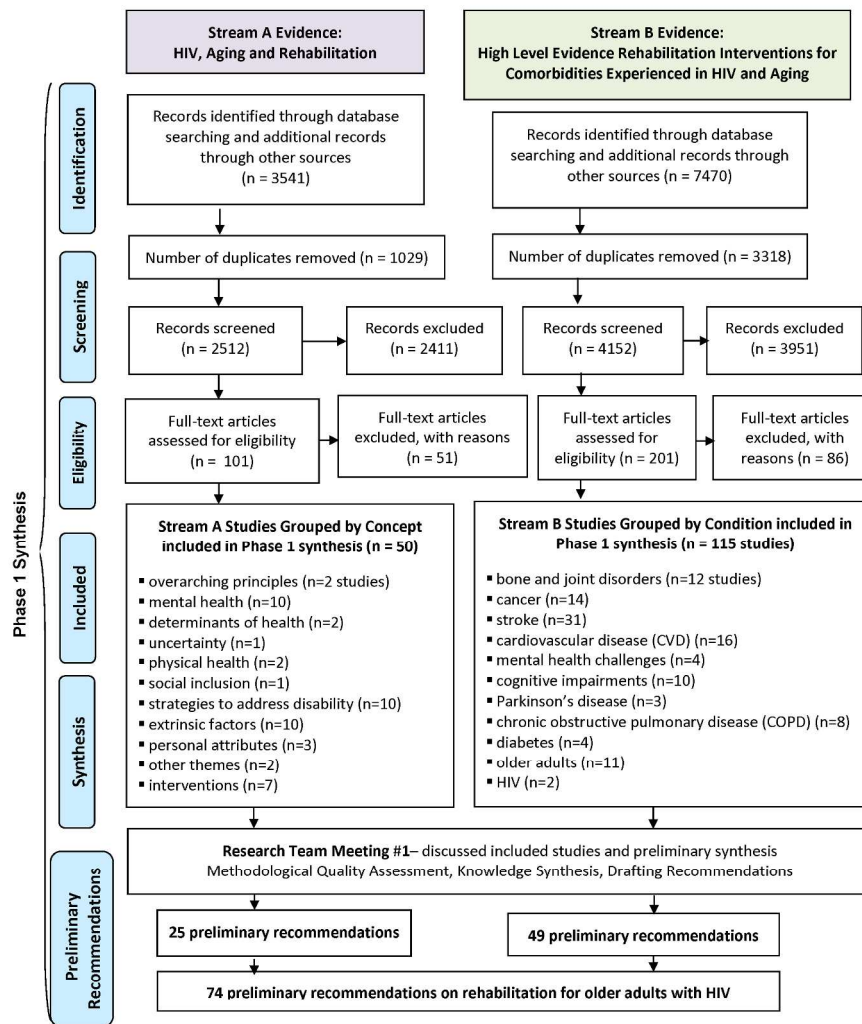
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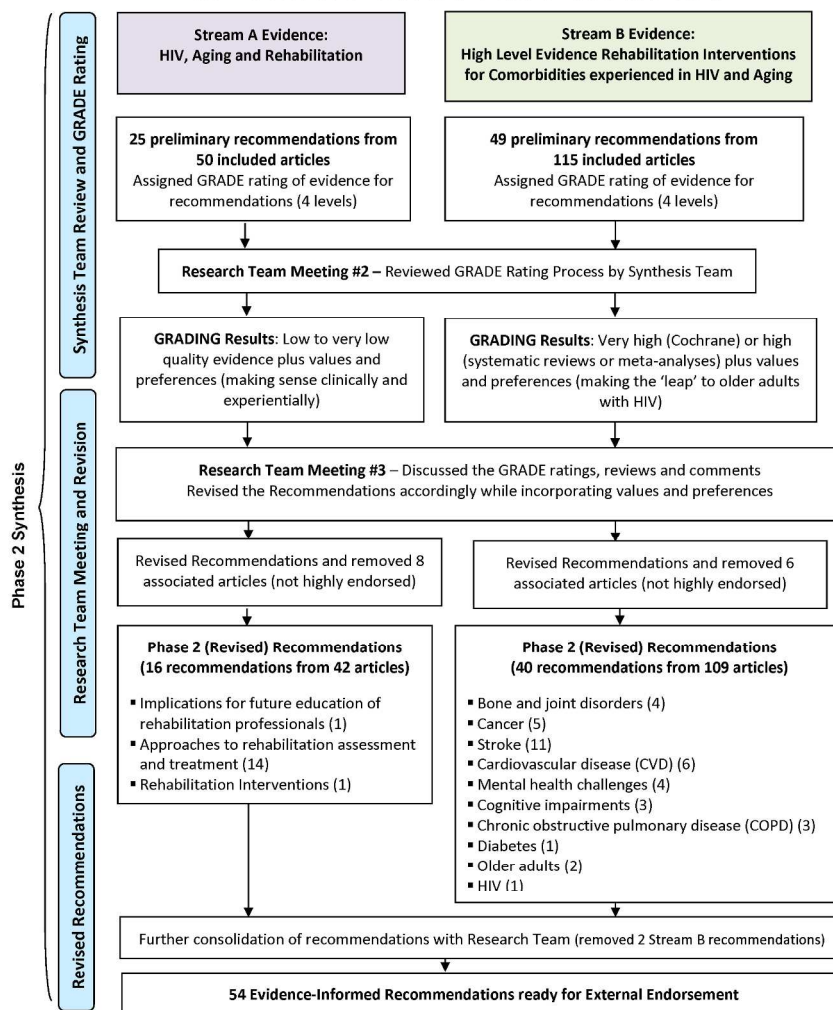
Figure 1: Overview of Knowledge Synthesis Procedure – Classification, Assessing Methodological Quality, Synthesis and Drafting Preliminary Recommendations (Phase 1)



Overview of Knowledge Synthesis Procedure – Classification, Assessing Methodological Quality, Synthesis and Drafting Preliminary Recommendations (Phase 1)
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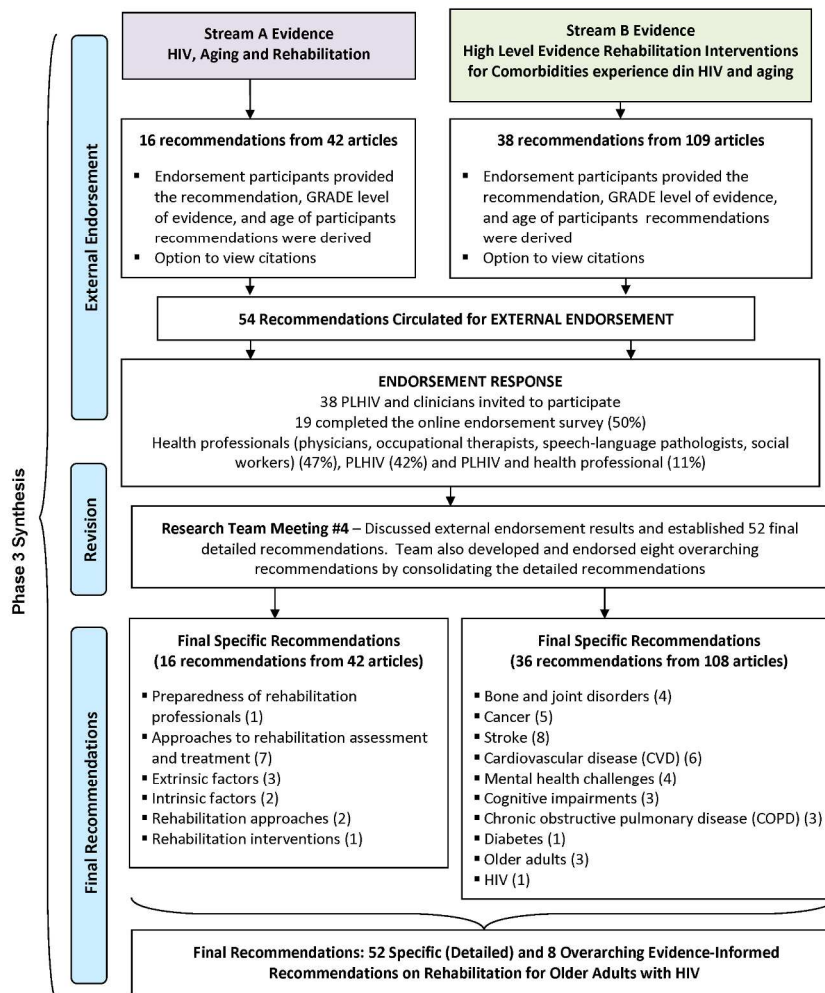
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Figure 2: Overview of Knowledge Synthesis Procedure – Research Team GRADING of Recommendations and Incorporating Values and Preferences (Phase 2)



Overview of Knowledge Synthesis Procedure – Research Team GRADING of Recommendations and Incorporating Values and Preferences (Phase 2)
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Figure 3: Overview of Knowledge Synthesis Procedure – External Endorsement (Phase 3)



Overview of Knowledge Synthesis Procedure – External Endorsement (Phase 3)
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Data Supplement File 1 –External Endorsement Results- Evidence Informed Recommendations on Rehabilitation for Older Adults Living with HIV

Of the 38 PHAs and clinicians invited to participate, 19 (50%) completed the endorsement survey. Of the 19 individuals, 9 (47.4%) were health professionals, 8 (42.1%) were people living with HIV and 2 (10.5%) were both a health professional and a person living with HIV. Health professional type included physicians (geriatrics and infectious diseases) (15.8%), occupational therapists (15.8%), speech-language pathologist (or therapist) (10.5%) and social workers (15.8%). We considered endorsement rates of >80%, 60-80% and <60% as high, moderate and low, respectively.

~Table reflects the draft recommendations sent for endorsement; hence the numbering and recommendations differ from the final recommendations presented in the Data Supplement File 2 (Final Recommendations).

*Indicates 1 missing response in level of endorsement

Number~	Draft Recommendation	Number of PLHIV and Clinicians who Endorsed the Recommendation (%)	# (%) who looked at Evidence Citations	Selected Comments from Endorsement Participants
1	Rehabilitation professionals should be prepared to provide care to older adults with HIV who present with complex comorbidities affecting neurological, cardiorespiratory and musculoskeletal systems that may result in physical, mental and social health challenges.	19 (100)	8 (42.1)	<p>Although many chronic illnesses lead to complex co-morbidities, HIV/AIDs brings with it stigma, secrecy and sometimes shame. Rehab professionals need to be prepared to adjust to this. Therefore rehab professionals need to be prepared to deal with HIV in particular.</p> <p>As a large part of the population living with HIV/AIDS ages, they encounter multiple complexities in daily life. The first step to preparing rehabilitation professions for this step would be a significantly greater understanding of the condition itself, and its impact on daily life. Rehab professionals have a large focus on aging issues as a part of their scope of practice anyway. Hence, understanding the complex comorbidities that accompany aging with HIV is not too much of an additional burden, but can go a mile when needed.</p> <p>A good understanding of some of the mental health aspects of long term HIV care would be a great help.</p> <p>It makes sense but have not seen many older patients get rehabilitation.</p>

Number~	Draft Recommendation	Number of PLHIV and Clinicians who Endorsed the Recommendation (%)	# (%) who looked at Evidence Citations	Selected Comments from Endorsement Participants
2	<p>Rehabilitation professionals <u>should</u> adopt an individualized approach to assessment and treatment of older adults living with HIV to fully understand the unique and complex needs of older adults with HIV. This approach should consider the intersections between personal and social attributes (race, gender, sexual orientation, ethnocultural background and socioeconomic status) and the broader determinants of health (housing, access to health care, poverty, racism, financial supports, income support, education, work and parenting roles)</p>	19 (100)	7 (36.8)	<p>It's discouraging to see that evidence is low for many of these recommendations as we have now lived with HIV/AIDs for 30 years.</p> <p>Management of HIV/AIDS largely depends on personal factors such as resources and social support systems, as has been evident in my practice. Thus it is very important to apply an individualized approach to assessment and treatment, in order to provide the best client-centered care.</p> <p>Just as living with any other chronic illness, living with HIV/AIDS plays out very differently in individuals. In my practice, I have seen social support, socioeconomic status as well work status largely differ and impact clients differently. Hence it is very important to adapt an individualized approach.</p> <p>I personally think a unique approach is best in every rehab case.</p> <p>I endorse it however I feel that the above recommendation could and should be said about any individual patient or patient population.</p> <p>This is generally true for all rehab patients.</p>
3	<p>Rehabilitation professionals <u>should</u> consider assessing diversity of physical and mental health outcomes during assessment, which include but are not limited to outcomes of disability, quality of life, stress, coping, anxiety and depression, retirement and financial issues, sexual and familial relationships, loneliness and social networks, cognition, and daily function.</p>	19 (100)	8 (42.1)	<p>Rehab professionals may need to be ready to refer an HIV+ client with any of the above concerns as he or she may not be addressing them as well as they could be addressed.</p> <p>There should be services ready to help back up the findings of the assessment. For example, if a new client is assessed as depressed what is the plan for next steps?</p> <p>Mental health issues as responses to societal oppression</p>

Number~	Draft Recommendation	Number of PLHIV and Clinicians who Endorsed the Recommendation (%)	# (%) who looked at Evidence Citations	Selected Comments from Endorsement Participants
				I endorse it however I feel that the above recommendation could and should be said about any individual patient or patient population.
4	Rehabilitation professionals should assess both physical impairment and functional activity with older adults living with HIV given physical symptoms or impairments (such as limitations in aerobic capacity) may not always translate into challenges with functional activities.	16 (84.2)	9 (47.4)	<p>Having a focus on functional activities is especially important in regards to assessing independence and impact of HIV on aging.</p> <p>Being an occupational therapist, functional impact of any impairment is the chief focus of my practice. Just as other symptoms, any impairment can have different functional impacts within individuals depending on lifestyle and priorities.</p> <p>ADLs and IADLs are important aspects of a psychosocial assessment.</p> <p>I would think functional abilities and limitations would be of more interest/relevance to OTs vs. assessing aerobic capacity.</p> <p>We do this for all elderly rehab patients why would it be different for HIV.</p> <p>Interventions need to be holistic in all regards</p>
5	Rehabilitation professionals <u>should</u> incorporate mental health assessment and treatment into the care of older adults with HIV as they are at risk of experiencing low mood, anxiety, depression, and suicide ideation.	19 (100)	7 (36.8)	<p>Substance use, concurrent disorders are tied into HIV population in general and I think should be mentioned here. Aging, HIV, chronic illness, mental illness can increase an older person's risk for substance use even have they have never had problems before. I think Assessment of concurrent disorders is important when looking at Mental Health.</p> <p>Extremely important based on my friends' experiences living with HIV/AIDS.</p>

Number~	Draft Recommendation	Number of PLHIV and Clinicians who Endorsed the Recommendation (%)	# (%) who looked at Evidence Citations	Selected Comments from Endorsement Participants
6	Rehabilitation professionals <u>should</u> conduct regular neurocognitive screening with older adults living with HIV, and where indicated, conduct complete assessments to identify early signs of HIV-associated executive functioning deficits (e.g. ability to keep appointments, adhere to medication regimens, and follow-up on recommendations) and interventions to effectively reduce or prevent cognitive impairments.	16 (84.2)	10 (52.6)	<p>Assessment and treatment in this area should be beyond the common understanding that PHAs experience episodes of depression; including social interactions, active daily living activities and other health related issues that may impact more broadly as people age - with or without a health issue.</p> <p>Since HIV/AIDS appears as more of a chronic condition in today's world, rather than a life threatening one, a lot of the symptoms have to be dealt with over a long period of time including access/intake of medications, management of side effects and maintaining relationships. All of which, much like other chronic conditions such as chronic pain, cancer, etc. can have an impact on the mental health of the person involved. Thus a focus on mental health assessment and treatment should be included.</p> <p>It is important to listen to every rehab client and to learn from them what their experience has been.</p> <p>Co-infected HIV/HCV may be at elevated risk for neurocognitive impairment.</p> <p>I agree but would recommend adding words "compensate" or "support" in addition to "prevent"/"reduce" as this may be the more realistic goal.</p> <p>I thought that there was significant evidence for early onset of cognitive impairments for many PHAs.</p> <p>Neurocognitive screening should be incorporated as standard practice in the treatment of HIV at all levels, and is currently often not addressed. This particularly needs to be incorporated in dealing with PHAs and aging.</p> <p>I had 1 patient with HIV CNS changes and this was very important.</p>

Number~	Draft Recommendation	Number of PLHIV and Clinicians who Endorsed the Recommendation (%)	# (%) who looked at Evidence Citations	Selected Comments from Endorsement Participants
7	Rehabilitation professionals <u>should</u> be aware of the potential impact of uncertainty among older adults with HIV and the psychological importance for some older adults to know the source of their symptoms (age-related versus HIV-related versus medication-related).	17 (89.5)	8 (42.1)	<p>In my practice, I realized that neurocognitive issues were a significant part of my assessment and intervention strategies, as they impact many adults living with HIV. When you combine in the aging factor, this area becomes even more important to focus on.</p> <p>Life can be a roller coaster of unforeseen illnesses and impairments for PHAs.</p> <p>I would endorse this as one of strongest areas that needs to be looked at and addressed and very much like that it addresses age-related versus HIV or medication related as far too often this area is determined to be illness or treatment related.</p> <p>Uncertainty is a factor for maybe older clients.</p> <p>Yes! Symptom ambiguity is a key area of understanding lived experiences of this population.</p> <p>True - just as rehab professionals should be aware of uncertainty of all chronic illnesses.</p> <p>Without Blood level monitoring for HIV drugs how would this be informed information?</p> <p>While this generally may be relevant for other aging and health challenges, it is very unique and important in the context of HIV and needs to be properly acknowledged and addressed.</p>
8	Rehabilitation professionals <u>should</u> consider the risk of social exclusion older adults with HIV may face in relation to race, ethnicity, gender, and sexual orientation in their assessment.	18 (94.7)	7 (36.8)	<p>Isolation seems to be common among those I know who are HIV+ or who have AIDS.</p> <p>It seems this statement neglects to consider the very real possibility of social exclusion based simply on HIV status.</p>

Number~	Draft Recommendation	Number of PLHIV and Clinicians who Endorsed the Recommendation (%)	# (%) who looked at Evidence Citations	Selected Comments from Endorsement Participants
9	Rehabilitation professionals <u>should</u> be knowledgeable of ageism as an added layer of stigma that may increase existing HIV stigma and homophobia experienced by older adults with HIV.	17 (89.5)	10 (52.6)	<p>Perhaps HIV and age-related stigma should be included in the language here?</p> <p>Internalized HIV Stigma and personal view on Discrimination also feeds into this in a Major way Do I withdraw and Isolate??</p> <p>Perhaps this should also include a recommendation around assessing of social networks/supports.</p> <p>This is especially important with the MSM community as ageism is a problem in the community with HIV....</p> <p>Experiences with my own life and with those of friends when dealing with elderly parents has opened my eyes to the pervasiveness of family, friends, caregivers and health providers looking to what they call the best interests of the elderly and not to their expressed interests which have precedent in law.</p> <p>Ageism exists in rehab. It is unpleasant to experience it, and can be very dis-heartening.</p> <p>See previous comment- absolutely. Interweaving oppression. Language should reflect not additive "isms", but rather a multiplicative effect that mutually co-construct and reinforce each other.</p> <p>I think this applies to all elderly, not just HIV.</p> <p>As I get older I have become aware that there is little to no communication platform for younger and older Gays and as an older gay man it has been hammered in to me about the appropriateness of these relationships, often I am left feeling like I am a predator rather than an Elder.</p>

Number~	Draft Recommendation	Number of PLHIV and Clinicians who Endorsed the Recommendation (%)	# (%) who looked at Evidence Citations	Selected Comments from Endorsement Participants
10	Rehabilitation professionals <u>should</u> understand the implications of HIV disclosure among older adults with HIV, be respectful of individualized choice surrounding disclosure and be prepared to discuss ways to ensure clients obtain the necessary supports surrounding disclosure.	17 (89.5)	8 (42.1)	<p>Strongly agree.</p> <p>I feel this statement is an excellent start but that 'implications of HIV Disclosure' should be further flushed out...even if just to indicate where the implications may lie (social, legal, etc).</p> <p>Everyone wants privacy, especially, surrounding disease or disability. I know many who have experienced a lack of understanding in regards to their status.</p> <p>The rehabilitation professional should be part of a team to address these issues - this implies it is done in isolation a working as.</p> <p>I'm not sure I understand ALL the implications around disclosure after being infected for 25 years.</p> <p>HIV criminal law is a significant issue that will continue to impact PHAs including aging PHAs, many of whom may still be sexually active. This will be an important topic for care givers to have basic knowledge, proper referrals and strong/clear policies and procedures in place.</p>
11	Rehabilitation professionals <u>should</u> be knowledgeable about the importance of social relationships and the need for emotional and practical social support to maximize physical, mental and psychological well-being for older adults with HIV.	18 (94.7)	10 (52.6)	<p>Social support plays a very important part in the success of any treatment/intervention plans with people living with HIV, especially those of older adults. Hence it is important to understand the impact (positive or negative) of the client's closest relationships as well as their social circle in general while assessing and planning their course of treatment.</p>
12	Rehabilitation professionals <u>should</u> consider the role of self-management strategies to promote health and wellness among older adults living with HIV.	18 (94.7)	9 (47.4)	<p>The rehab recommendations may be used for several years. Self management to the best degree is vital.</p> <p>Self-management strategies such as learning to cope with pain, managing medications efficiently are some of the interventions that have worked very well with people living</p>

Number~	Draft Recommendation	Number of PLHIV and Clinicians who Endorsed the Recommendation (%)	# (%) who looked at Evidence Citations	Selected Comments from Endorsement Participants
				with HIV in my practice.
				Is there a way to determine whether or not someone has Healthy coping strategies or not How would resilience be determined?
13	Rehabilitation professionals <u>may consider</u> the importance and role of spirituality in the health of older adults with HIV depending on the individual.	16 (84.2)	7 (36.8)	<p>I see spirituality as including the expression of humanity and commonalities between health providers and PHAs.</p> <p>I am very pleased to see this area included and strongly support this recommendation. Quite often overlooked at any stage of HIV infection and other health-related issues.</p> <p>It was something I needed and had to search for. Not sure how important it is to the HIV community specifically.</p> <p>Very important in my experience.</p> <p>We have left Spirituality out of many conversations because it is too contentious, it needs to be reintroduced. The fruit of the Spirit is Love, Joy, Peace, Patience, Kindness Goodness, Faithfulness, Gentleness and Self-control. Quote from Rev. Brent Hawkes.</p> <p>I actually think professionals SHOULD consider this, however, it's very complicated and most professionals would not differentiate religion from spirituality which would often be quite negative so this recommendation makes sense in that regard.</p>
14	Rehabilitation professionals <u>should</u> use an interprofessional approach to practice that is sensitive to the unique and individualized values and preferences of older adults with HIV while considering issues of culture, stigma and discrimination. Specifically rehabilitation professionals should communicate	18 (84.7)	9 (47.4)	<p>Strongly endorse this recommendation.</p> <p>Holistic approaches seem to work best.</p> <p>Each individual in spite of disease or disability has similar needs.</p> <p>As rehab professionals, it is very important to adapt an</p>

Number~	Draft Recommendation	Number of PLHIV and Clinicians who Endorsed the Recommendation (%)	# (%) who looked at Evidence Citations	Selected Comments from Endorsement Participants
	information surrounding care, treatment and education in a way is tailored to the specific needs of older adults with HIV to optimize physical and mental health and well-being.			inter-professional approach to provide client centered care. Clients may need better interpretation of impairments described to them by their doctors in terms of functional limitations, or strategies to overcome these limitations. Hence open dialogue is very necessary within the treatment team to better plan care.
15	Rehabilitation professionals <u>should</u> inquire about the nature and extent to which older adults with HIV use complementary and alternative medicine (CAM) and consider the potential benefits and side effects of CAM interventions.	16 (84.2)	9 (47.4)	For many PHAs these options are financially out of reach. Still would be good to know for the rehab provider.
16	Exercise (specifically progressive resistive exercise) <u>may be recommended</u> for associated improvements in strength, body composition, and physical fitness in older adults living with HIV. Specifically, resistive exercise may be considered for use among older adults who are frail or debilitated to increase muscle strength and mitigate wasting.	15 (78.9)	8 (42.1)	I do this kind of work every day with seniors and with people living with dementia. I am a believer, but find few want to pay to get good fitness provided in this area. For older patients I think you have to tailor the degree or exercise to the degree of frailty. Probably works for everyone.
17	Aerobic and resistive exercise <u>may be recommended</u> for at least 20 minutes at least 3 times per week for at least 5 weeks for older adults living with HIV who are medically stable with the potential to maintain or enhance outcomes of cardiopulmonary fitness, weight and body composition, strength, and quality of life.	16 (84.2)	9 (47.4)	Are there no studies using the benefits of Yoga or Tai Chi for older populations it would seem to be a more holistic with its combination of strength, balance, agility, and mental focus.
18	Regular forms of exercise including (strength/resistance training, aerobic/cardiovascular endurance training, and balance/stability training) may be strongly recommended for older adults with HIV who are medically stable to reduce fall rates, improve functional and physical performance, improve	16 (84.2)	8 (42.1)	Poverty among PHAs means that home-based exercise may be the only viable option. I don't like home based there is no added value like interpersonal contact and association Group energy can be synergistic.

Number~	Draft Recommendation	Number of PLHIV and Clinicians who Endorsed the Recommendation (%)	# (%) who looked at Evidence Citations	Selected Comments from Endorsement Participants
	cardiopulmonary fitness, reduce depressive symptoms, and improve mood and quality of life.			
19	Multidisciplinary forms of rehabilitation is strongly recommended for older adults with HIV who are hospitalized to promote earlier discharge directly home from hospital and reduced costs associated with hospitalization.	18 (94.7)	8 (42.1)	I more strongly endorse follow up with a similar course of action to avoid re-hospitalization. PT/OT/SW trifecta works well in emergency environments and others. This is critical.
20	Occupational therapy may be an important component of rehabilitation for older adults living with HIV with functional impairments and is strongly recommended for elderly community dwellers, specifically for advising on adaptive devices; mobility devices; energy conservation; cognitive training; training of skills to use adaptive devices to enhance functional ability, and to enhance social participation and quality of life.	18 (94.7)	8 (42.1)	In my practice with people living with HIV, I have found an indispensable role for OT in terms of areas described above such as adaptive devices, mobility devices, energy conservation and cognitive strategies. OT was well received. Is training on using social media part of this?? i.e. computer training and the use of things like learning about facebook or even how to set up your own blog or how to find web sites and information in searches??
21	Supervised exercise sessions <u>should be recommended</u> to older adults living with HIV with knee and/or hip osteoarthritis (OA) who are medically stable to improve pain and physical function. A combination of low impact exercise in the form of jogging, stair climbing and walking, combining with high-magnitude resistance training should be recommended for older adults with HIV to preserve bone mineral density.	14 (73.7)	6 (31.6)	Need to recognize the feasibility of implementing these types of supervised programs accepting the other social issues in HIV. Although I don't agree that these should be the only options explored again Yoga and tai chi also provide good results maybe just not researched well. I endorse based on this process and evidence but have no personal or direct professional opinion.
22	Balance and strengthening exercises <u>should</u> be part of an overall exercise program to decrease falls and risk of fall-related fractures for older adults with HIV and low bone mineral density (BMD).	17 (89.5)	7 (36.8)	No comments

Number~	Draft Recommendation	Number of PLHIV and Clinicians who Endorsed the Recommendation (%)	# (%) who looked at Evidence Citations	Selected Comments from Endorsement Participants
23	Multidisciplinary rehabilitation teams comprised of OT and PT across the continuum of care should be recommended for older adults with HIV who sustain a hip fracture. Specifically, inpatient geriatric rehabilitation programs are strongly recommended and may be an ideal intervention as they have the potential to reduce nursing home admission, mortality and improve functional status.	16 (84.2)	6 (31.6)	<p>If a high frequency program was available as an outpatient could this possibly be as good as inpatient?</p> <p>My experience with the elderly in long-term care homes showed me that rehab programming for the elderly was minimal. As time passed person after person lost mobility leading eventually to life in a wheel chair.</p> <p>So spend some time on determining which interventions and outcomes would be most suitable.</p>
24	Self-management programs may be considered as a component of a rehabilitation program to address disability and pain for older adults living with HIV and arthritis.	15 (78.9)	7 (36.8)	<p>How well would these work in HIV with other issues?</p> <p>It would depend on the person's ability of self-discipline.</p>
25	A combination of aerobic and resistance exercise at moderate intensity <u>may be recommended</u> for older adults living with HIV and cancer to reduce cancer-related fatigue during and after treatment for cancer. Any exercise intervention should be individualized based on the targeted health outcome and cancer type.	14 (73.7)	8 (42.1)	<p>Too often we look at our limitations NOT what we can still do or how we just do it differently.</p> <p>I endorse based on this process and evidence but have no personal or direct professional opinion.</p>
26	A combination of aerobic and resistive exercise at least twice a week for at least 2 weeks at 50-90% VO2max intensity is safe and <u>may be recommended</u> for older adults living with cancer for improvements in physiological measures, symptoms, physical and psychosocial functioning of patients and health-related QOL. Positive effects of exercise may vary significantly as a function of the type of cancer; the stage of disease; the medical treatment; the nature, intensity, and duration of the exercise program; and the	13 (68.4)	6 (31.6)	<p>I endorse based on this process and evidence but have no personal or direct professional opinion.</p>

Number~	Draft Recommendation	Number of PLHIV and Clinicians who Endorsed the Recommendation (%)	# (%) who looked at Evidence Citations	Selected Comments from Endorsement Participants
	lifestyle of the patient.			
27	Exercise may be beneficial for self-empowerment and <u>should</u> be recommended for older adults living with HIV who are also living with lung cancer who are medically stable.	14 (73.7)	7 (36.8)	I endorse based on this process and evidence but have no personal or direct professional opinion.
28	Supervised aerobic exercise programmes should be included during breast cancer treatment for the management of cancer related fatigue for older women living with HIV and breast cancer who are medically stable. A combination of aerobic and resistive exercise at least 3 times per week for at least 6 weeks, 30-40 minutes per session, at moderate intensity (e.g. rate of perceived exertion 11-13 out of 20) appears to be safe and may be recommended for older women living with HIV undergoing or who have undergone treatment for breast cancer and who are medically stable for potential improvements in cardiopulmonary fitness, physical functioning, fatigue, and body composition and quality of life.	14 (73.7)	7 (36.8)	although all these may be needed to be presented as a longitudinal lifestyle change not just short term interventions. I endorse based on this process and evidence but have no personal or direct professional opinion.
29	A combination of aerobic and resistive exercise <u>may be recommended</u> for older adults living with HIV and metastatic cancer (either HIV-related or not) who are medically stable for improvements in quality of life and physical health status.	10 (52.6) <i>[deleted from the final recommendations]</i>	8 (42.1)	Not all HEALING requires a CURE. Acceptance doesn't preclude fighting. I endorse based on this process and evidence but have no personal or direct professional opinion.
30	Inconclusive or insufficient evidence exists to derive recommendations for cognitive rehabilitation interventions for older adults with HIV and stroke. While cognitive rehabilitation does not appear	19 (100)	6 (31.6)	There needs to be age targets for baseline determinants. Key to determine baseline and monitor for non-stroke related cognitive issues and required support/care.

Number~	Draft Recommendation	Number of PLHIV and Clinicians who Endorsed the Recommendation (%)	# (%) who looked at Evidence Citations	Selected Comments from Endorsement Participants
	harmful, weak evidence exists to support the use of cognitive-specific interventions to improve spatial neglect, disability, memory, and functional status for older adults who experience stroke. Rehabilitation professionals should implement specific task oriented training with older adults living with HIV and stroke as this approach is key to retraining skill specific tasks related to function.			
31	Stroke rehabilitation for older adults with HIV <u>should</u> multi-disciplinary including occupational therapy, physical therapy, and speech-language pathology to improve the ability to undertake personal activities of daily living and reduce risk of deterioration in ability. Stroke rehabilitation may include the following components: therapeutic exercise, task-oriented training, gait-oriented training, balance training, strength training, wheelchair mobility, home modification, cognitive adaptation, and treatment of shoulder subluxation for those who experience a sub-acute or post-acute stroke (within 1 year).	19 (100)	7 (36.8)	No comments
32	There exists inconclusive or insufficient evidence on the effectiveness of long-term rehabilitation interventions on patient or carer outcomes 1 year post stroke are to provide a recommendation for older adults with HIV and stroke.	*9 (47.4) <i>[deleted from final recommendations]</i>	8 (42.1)	I do not understand this recommendation. I'm unclear as to what is recommended here - further action or no action after a year. I see improvements in post=stroke patients days, weeks, months and years after their strokes. I found the wording of that recommendation confusing - I am not sure what the exact recommendation is.

Number~	Draft Recommendation	Number of PLHIV and Clinicians who Endorsed the Recommendation (%)	# (%) who looked at Evidence Citations	Selected Comments from Endorsement Participants
33	Occupational therapy <u>should</u> be recommended as a component of rehabilitation for older adults living with HIV with stroke as interventions targeted towards personal activities of daily living may increase ADLs and reduced death, deterioration and dependency.	17 (89.5)	7 (36.8)	No Comments
34	Physiotherapy comprised of a combination of interventions <u>should</u> be recommended for the recovery of postural control and lower limb function for older adults living with HIV following stroke.	17 (89.5)	5 (26.3)	I endorse based on this process and evidence but have no personal or direct professional opinion.
35	Electromechanical-assisted gait training in combination with physiotherapy <u>may be recommended</u> for older adults living with HIV with stroke (particularly those within 3 months post stroke) as this intervention is associated with a higher likelihood to achieve independent walking than gait training alone.	12 (63.2)	5 (26.3)	I endorse based on this process and evidence but have no personal or direct professional opinion.
36	Combined aerobic and resistive exercise <u>should</u> be a component of stroke rehabilitation for older adults living with HIV with stroke who are medically stable at any stage of motor recovery. Higher doses of exercise may be associated with better motor recovery. Specifically, cardiorespiratory training should be a component of exercise as evidence suggests speed, tolerance and independence during walking are improved. Specifically, strength training may be a component as this can improve muscle strength in stroke patients and will not necessarily increase spasticity.	15 (78.9)	4 (21.1)	No Comments

Number~	Draft Recommendation	Number of PLHIV and Clinicians who Endorsed the Recommendation (%)	# (%) who looked at Evidence Citations	Selected Comments from Endorsement Participants
37	<p>Electrotherapeutic modalities <u>alone are not recommended</u> for older adults living with HIV with stroke over conventional rehabilitation interventions strategies. There exists very weak to no evidence to support the use of electrotherapeutic modalities (functional electrical stimulation, biofeedback, visual feedback therapy) over conventional PT interventions along for muscle strength recovery, upper limb recovery or balance post stroke.</p>	10 (52.6)	4 (21.1)	No Comments
38	<p>Cardiac rehabilitation in the form of home-based or centre-based care <u>may be recommended</u> because these appear equally effective in improving the clinical & health related quality of life outcomes for older adults with HIV with low risk cardiovascular disease. The choice of home versus centre-based care should be reflective of the individual preference of the patient as this may impact the uptake of rehabilitation.</p>	15 (78.9)	6 (31.6)	Strongly support this recommendation.
39	<p>Cardiac rehabilitation for older adults with HIV should include reinforcement, feedback, offer opportunity for individualization, facilitate behaviour change through skills and resources and be relevant to patients needs and abilities. Specifically, motivational communication such as formal cardiac rehabilitation program referral, reminder letters, phone calls and home visits may be recommended for increasing uptake and adherence of cardiac rehabilitation among older adults living with HIV and cardiovascular disease.</p>	16 (84.2)	5 (26.3)	Would this include an ability to determine emotional state depression would affect motivation?

Number~	Draft Recommendation	Number of PLHIV and Clinicians who Endorsed the Recommendation (%)	# (%) who looked at Evidence Citations	Selected Comments from Endorsement Participants
40	<p>Exercise-based cardiac rehabilitation should be recommended for older adults with HIV who have undergone a myocardial infarction (MI) (otherwise known as a heart attack) (or at risk of an MI) given evidence suggests exercise based cardiac rehabilitation is effective in reducing cardiac deaths. The ideal frequency, intensity, time and type of exercise to maximize benefits are unclear. Early mobilization and rehabilitation and specifically, secondary and tertiary prevention programs (including counseling, education, and exercise) should be recommended to older adults living with HIV who experience an MI as these have the potential to reduce subsequent MI and mortality and improve processes of care, risk factor profiles and functional status and quality of life.</p>	*14 (73.7)	4 (21.1)	Endorse based on this process and evidence but have no personal or direct professional opinion.
41	<p>Moderate intensity exercise (and potentially progressive resistive exercise) should be recommended for older adults with HIV with cardiovascular disease who are medically stable to reduce high blood pressure and potentially mitigate the effect of coronary heart disease. Exercise may be associated with improved cardiovascular health and well-being as a result of enhanced self-efficacy. More research is required to determine the ideal frequency and duration of exercise that should be recommended to see psychological improvement. High intensity aerobic exercise may increase HDL-C levels, while combined aerobic and resistance exercise may lower LDL-C levels</p>	16 (84.2)	5 (26.3)	Again I refer to yoga.

Number~	Draft Recommendation	Number of PLHIV and Clinicians who Endorsed the Recommendation (%)	# (%) who looked at Evidence Citations	Selected Comments from Endorsement Participants
	and should be recommended for older adults with HIV to improve their cardiovascular health.			
42	Home-based moderate intensity exercise (and potentially progressive resistive exercise) as well as supervised and hospital-based exercise programs appear to be safe and <u>should be recommended</u> for older adults with HIV and heart failure who are medically stable for potential improvements in cardiac function, exercise capacity (including peak oxygen consumption), physical function, mortality and quality of life and potentially a reduction in hospital admissions. Optimal session frequency, session duration, exercise intensity, program duration is unclear.	*14 (73.7)	4 (21.1)	I think that what is not addressed for many of these recommendations is lack of funding for them at home or in day care settings. Programs need not be hospital based.... development of community partner links would probably be more cost effective and affordable for all parties senior programs may need better development and funding.
43	Aerobic exercise (and possibly resistive exercise) at least 3 times per week may be recommended to older adults living with HIV and hyperlipidemia for the potential to improve blood lipids. Clinical importance of the changes are questionable.	*14 (73.7)	3 (15.8)	Recommending fitness is not enough. There should be programs to help the client succeed with the fitness recommendations. I endorse based on this process and evidence but have no personal or direct professional opinion.
44	Inconclusive or insufficient evidence exists to support a recommendation for a specific model of mental health care (acute psychogeriatric care over acute psychiatric units versus other mental health services) for older adults with HIV living with mental health issues. More research is needed before recommending one model of care over another.	17 (89.5)	6 (31.6)	Do we have the resources to be able to ask care units to engage in this kind of placement strategy or patient tracking?
45	Exercise appears safe and <u>should be recommended</u> (approximately 30 minutes per session) to older adults with HIV living	16 (84.2)	6 (31.6)	Not sure about the second part "to mitigate anxiety" in this population of HIV positive.

Number~	Draft Recommendation	Number of PLHIV and Clinicians who Endorsed the Recommendation (%)	# (%) who looked at Evidence Citations	Selected Comments from Endorsement Participants
	with other chronic conditions illnesses such as CVD, cancer, chronic pain, fibromyalgia as a way to mitigate symptoms of anxiety.			There is an old exercise regime for the cure or relief of fibromyalgia I'm not convinced that my pain level isn't a function of time accumulation without relief of pain my pain isn't treated and so my pain just keeps being reinforced AND added to daily.
46	Inconclusive or insufficient evidence exists to support the use of cognitive behavioural therapy with older adults with HIV and depression.	14 (73.7)	9 (47.4)	<p>Is there any information on Mindfulness Based Approach?</p> <p>I'm unclear as to what is recommended - action or no action.</p> <p>Regardless of intervention, metastudies show that it is the nature of the therapeutic relationship that makes the difference, therefore, clinicians should be able to work in a multitude of cognitive, behavioural, and emotion-focused modes of treatment.</p> <p>It would have to be individually based as to whether someone would benefit from cognitive behavioral therapy (CBT) - and not diagnosis/population based.</p> <p>This has worked for me I have many learned tools in my kit some I use daily.</p> <p>You should however mention that there is strong evidence for CBT (at least I thought there was) for CBT in younger adults with HIV.</p> <p>Anecdotally, CBT and other mental health interventions are important resources and options for good care.</p>
47	Supporting older adults living with HIV in securing safe and stable housing <u>should</u> be an important component of the rehabilitation process for older adults with HIV with severe mental illness given the positive impact of stable housing for this target population.	18 (94.7)	6 (31.6)	<p>Highly important, given the high levels of poverty among PHAs.</p> <p>Yes, in many cases housing first strategies are successful in mitigating mental health issues.</p> <p>Safe and secure housing should be a right for ALL people please refer to Positive spaces, Healthy spaces study.</p>

Number~	Draft Recommendation	Number of PLHIV and Clinicians who Endorsed the Recommendation (%)	# (%) who looked at Evidence Citations	Selected Comments from Endorsement Participants
48	<p>Cognitive interventions including cognitive training, cognitive stimulation, and cognitive rehabilitation <u>should</u> be recommended for older adults living with HIV with mild cognitive impairment because they are associated with significant improvements objective and subjective measures of memory, quality of life and mood / anxiety with benefits translated to improvements in daily functioning and mood. Specifically, errorless learning may be recommended for a potential positive effect on recall for older adults with HIV and cognitive impairment.</p>	17 (89.5)	7 (36.8)	It is unclear whether this applies to HIV associated dementia Probably wouldn't hurt but may be expensive and resource intensive.
49	<p>A combination of aerobic and resistive (strengthening) exercise <u>should be recommended</u> for older adults living with HIV with cognitive impairment for improvements in fitness, physical function, cognitive function, and positive behavior. Evidence suggests older adults with cognitive impairment may benefit from exercise as much as older adults with no cognitive impairment. Due to diversity in exercise programs, measures of cognition, and study populations in the evidence, the optional type of exercise program (content, intensity, frequency, and duration) is unclear. Specifically, aerobic exercise may be associated with improvements in neurocognitive function among older adults with HIV with cognitive impairment for attention and processing speed, executive function, and memory.</p>	18 (94.7)	7 (36.8)	Again yoga utilizes mental focus for exercises.

Number~	Draft Recommendation	Number of PLHIV and Clinicians who Endorsed the Recommendation (%)	# (%) who looked at Evidence Citations	Selected Comments from Endorsement Participants
50	Physical exercise appears to be safe and may be recommended for older adults living with HIV and dementia however insufficient evidence exists to suggest benefits to cognition, function, behaviour, depression, and mortality.	15 (78.9)	6 (31.6)	I lead a dementia friendly class twice a week. The results are great and the group shows up consistently and we have fun.
51	Pulmonary rehabilitation (including upper and lower extremity exercise, inspiratory muscle training and breathing exercises) for at least four weeks is <u>safe and strongly recommended</u> for older adults living with HIV who have COPD to reduce mortality, improve dyspnea, health-related quality of life, functional exercise capacity and reduce future hospital admissions. Individuals with more severe COPD may require longer rehabilitation programs of at least 6 months to demonstrate benefits.	14 (73.7)	5 (26.3)	Important, given high levels of smoking at some point in lifetime among PHAs. This needs to be rolled out as a lifestyle change not just short term intervention. I endorse based on this process and evidence but have no personal or direct professional opinion.
52	Aerobic and progressive resistance exercise at least two times per week for at least 8 weeks appears feasible, safe and may be recommended for older adults with HIV with mild to moderate COPD for improvements in exercise capacity and muscle strength that may translate into improved activity performance and societal participation. Careful consideration is required when prescribing progressive resistance exercise programs for people with COPD who have comorbid health conditions.	13 (68.4)	4 (21.1)	I endorse based on this process and evidence but have no personal or direct professional opinion.
53	Inspiratory muscle training (IMT) in the form of targeted, threshold or normocapneic hyperventilation is an important component of pulmonary rehabilitation and is <u>strongly</u>	12 (63.2)	5 (26.3)	I endorse based on this process and evidence but have no personal or direct professional opinion.

Number~	Draft Recommendation	Number of PLHIV and Clinicians who Endorsed the Recommendation (%)	# (%) who looked at Evidence Citations	Selected Comments from Endorsement Participants
	<p>recommended for older adults living with HIV with COPD to improve inspiratory muscle strength and endurance, dyspnea, exercise capacity and quality of life. Optimal frequency, intensity, supervision and duration of IMT is unclear.</p>			
54	<p>Aerobic resistive exercise for at least 8 weeks is strongly recommended for older adults living with HIV with diabetes (type 2) to improve cardiopulmonary fitness and ensure glucose control. Optimal frequency, intensity, time and type of exercise are unclear however evidence suggests increased exercise prescription, fitness testing, supervision and group sessions at a greater number of times per week may be associated with greater health benefits.</p>	17 (89.5)	(21.1)	<p>What happens after 8 weeks - it doesn't work or they should stop.</p> <p>Important since diabetes is increasingly seen in PHAs as a result of treatment side effects.</p>

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Canadian Working Group on HIV and Rehabilitation
Groupe de travail canadien sur le VIH et la réinsertion sociale

Evidence-Informed Recommendations in Rehabilitation for Older Adults Living HIV

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Evidence-Informed Recommendations in Rehabilitation for Older Adults Living with HIV

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Executive Summary

Background: Adults aging with HIV are living with the physical, social and psychological consequences of HIV disease, long term treatment, and comorbidities associated with aging. Rehabilitation including occupational therapy, physical therapy and speech-language pathology, can assist in managing the health related challenges or disability associated with HIV and aging.

Aim: Our aim was to develop clinical evidence-informed recommendations on rehabilitation for older adults living with HIV.

Methods: We conducted a knowledge synthesis, combining research evidence specific to HIV, rehabilitation and aging, with evidence on rehabilitation interventions for common comorbidities experienced by older adults with HIV. We searched for and included: highly relevant HIV-specific research addressing rehabilitation and aging (Stream A) and high-quality evidence (systematic reviews and meta-analyses) on the effectiveness of rehabilitation interventions for comorbidities commonly experienced by older adults aging with HIV (specifically bone and joint disorders, cancer, stroke, cardiovascular disease, mental health, neurocognitive decline, cardiopulmonary disease, diabetes) (Stream B). We extracted and synthesized relevant data from included studies to draft evidence-informed recommendations on rehabilitation for older adults aging with HIV. Draft specific recommendations were refined based on people living with HIV (PLHIV) and clinicians' values and preferences, reviewed by an inter professional team for GRADE (quality) rating and revision, and then circulated to a new group of PLHIV and clinicians for external endorsement and final refinement. We then consolidated the detailed specific recommendations into overarching recommendations to broadly guide rehabilitation for older adults with HIV.

Results: This synthesis yielded eight overarching and 52 specific recommendations. Thirty-six specific recommendations were derived from 108 moderate or high level research evidence articles (meta-analyses and systematic reviews) that described the effectiveness of rehabilitation interventions for adults living with health conditions that may be experienced by older adults with HIV. Recommendations address specific rehabilitation interventions across eight health conditions experienced by older adults with HIV: bone and joint disorders, cancer, stroke, cardiovascular disease, mental health issues, cognitive impairments, chronic obstructive pulmonary disease, and diabetes. Sixteen specific recommendations were derived from 42 research evidence articles specific to rehabilitation for older adults with HIV. The quality of evidence from which these recommendations were derived was either low or very low, consisting primarily of narrative reviews or descriptive studies with small sample sizes. These recommendations address approaches to rehabilitation assessment and interventions, and contextual factors to consider with rehabilitation of older adults living with HIV.

Overall, we established eight overarching and 52 specific evidence-informed recommendations from a combination of low level evidence specific to HIV, aging and rehabilitation, and high level research evidence describing the effectiveness of rehabilitation interventions for comorbidities that may be experienced by older adults with HIV. PLHIV and clinician values and preferences were integral in developing these recommendations. These evidence-informed recommendations

1
2 provide a comprehensive guide for rehabilitation with older adults with HIV and those who may
3 present with comorbidities.
4

5 **How are the Recommendations Presented in this Document?**

6
7 The evidence-informed recommendations on rehabilitation for older adults living with HIV are
8 presented in the form of overarching and specific detailed recommendations. Specific
9 recommendations are presented in two streams that represent the two different bodies of
10 research evidence from which the recommendations were derived.
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12

13 ***Specific Recommendations***

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15 Results for the first part of the synthesis (Stream A) include 16 recommendations derived from 42
16 research evidence articles specific to rehabilitation for older adults living with HIV. The level of
17 evidence from which these recommendations were derived was either low or very low, meaning
18 the articles were mostly narrative review articles or descriptive studies (either qualitative or
19 quantitative) with small sample sizes. Even though a recommendation may be derived from low
20 level evidence, it still may be highly endorsed if found to make good clinical and experiential sense
21 from the perspective of clinicians or PLHIV.
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23

24
25 Results for the second part of the synthesis (Stream B) include 36 recommendations derived from
26 108 moderate or high level research evidence articles (meta analyses and systematic reviews)
27 describing the effectiveness of rehabilitation interventions for adults living with comorbidities that
28 may be experienced by older adults with HIV.
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31 All specific recommendations were reviewed and revised three times with the synthesis team that
32 includes researchers, clinicians and people living with HIV. All specific recommendations also were
33 circulated to 17 PLHIV and clinicians who work in HIV care for endorsement.
34
35

36 ***Overarching Recommendations***

37
38 To facilitate knowledge transfer and exchange, it became apparent that we needed to establish
39 overarching recommendations that summarized the detailed recommendations in a condensed
40 manner. We consolidated the 52 specific (or detailed) recommendations into eight overarching
41 recommendations on rehabilitation for older adults living with HIV. These recommendations
42 provide a broader and more general overview of the evidence synthesis.
43
44

45 **How can the Recommendations be used?**

46
47 We present an overview of the overarching recommendations followed by the more specific
48 (detailed) recommendations. Overarching recommendations may be used by any rehabilitation
49 professional and other health providers who may potentially work with older adults living with HIV
50 in their practice. Specific (or detailed) recommendations may be used by rehabilitation
51 professionals and other health providers working with older adults living with HIV who would like
52 more specific guidance on evidence-informed recommendations for interventions across specific
53 comorbidities.
54
55

Overarching recommendations in rehabilitation for older adults living with HIV

We offer eight overarching recommendations derived from the 52 specific recommendations that were developed from evidence specific to rehabilitation for older adults with HIV as well as high level evidence on rehabilitation interventions across comorbidities commonly experienced by older adults with HIV. The following recommendations serve as a general guide to providing rehabilitation care, treatment and support with older adults living with HIV.

For each general recommendation, where applicable, we refer to the specific (or detailed) recommendations from which they were derived.

Summary Recommendation 1: Rehabilitation professionals should be prepared to provide care to older adults with HIV who present with **complex comorbidities** affecting neurological, cardiorespiratory and musculoskeletal systems that may result in physical, mental and social health challenges. *(Original detailed recommendation #1)*

Summary Recommendation 2: Rehabilitation professionals should adopt an **individualized and interprofessional approach to practice** that is sensitive to the **unique values, preferences and needs of older adults with HIV**. This approach should include comprehensive assessment and treatment of **physical, neurocognitive and mental health impairments, uncertainty (or worrying about the future), functional activity limitations, and social exclusion** while considering the intersections between **personal and social attributes** and the **broader determinants of health**. *(Combination of detailed recommendations #2 – 8, 14, and 18)*

Summary Recommendation 3: **Multidisciplinary rehabilitation** including physical therapy, occupational therapy and speech-language pathology is strongly recommended across the **continuum of care** (acute, rehabilitation and community-based care) for older adults with HIV to address the multi-dimensional and episodic nature of disability attributed to HIV and its comorbidities such as bone and joint disorders, cancer, stroke, cardiovascular disease, mental health, cognitive impairment, chronic obstructive pulmonary disease (COPD) and diabetes. *(Combination of detailed recommendations #14, 18, 20 and 23)*

Summary Recommendation 4: Rehabilitation professionals should consider the role of **extrinsic contextual factors** such as stigma and ageism, HIV disclosure, and emotional and practical social supports on the health and well-being of older adults living with HIV. *(Combination of detailed recommendations #9-11)*

Summary Recommendation 5: Rehabilitation professionals should consider the role of **intrinsic contextual factors** such as self-management and spirituality on the health and well-being of older adults living with HIV. (*Combination of detailed recommendations #12-13*)

Summary Recommendation 6: A **combination of aerobic and resistive exercise** may be recommended for older adults living with HIV who are medically stable and living with comorbidities including bone and joint disorders, cancer, stroke, cardiovascular disease, stroke, mental health, cognitive impairment, chronic obstructive pulmonary disease (COPD), and diabetes. The frequency, intensity, time and type of exercise should be individually tailored to the specific goals and capacity of the individual and the specific comorbidity. (*Combination of detailed recommendations on exercise across all comorbidities*)

Summary Recommendation 7: **Cognitive rehabilitation interventions** (e.g. cognitive training, cognitive stimulation, cognitive rehabilitation) may be recommended for older adults living with HIV with mild cognitive impairment, and stroke. Inconclusive or insufficient evidence exists to support the use of **cognitive behavioural therapy** with older adults with HIV with **depression**. While cognitive rehabilitation does not appear harmful, weak evidence exists to support the use of cognitive-specific interventions to improve spatial neglect, disability, memory, and functional status for older adults who experience stroke. Rehabilitation professionals are encouraged to refer to specific clinical practice guidelines for each health condition to determine the effects of different cognitive interventions for older adults with HIV living with comorbidity. (*Combination of detailed recommendations #29, 44, 46*)

Summary Recommendation 8: In the absence of high level evidence on rehabilitation interventions for older adults living with HIV and comorbidities, rehabilitation professionals should refer to **existing clinical practice guidelines, systematic reviews, meta-analyses, and other forms of high level evidence for recommendations on interventions for a specific comorbidity**. These recommendations should be applied using an individualized approach incorporating the unique values, preferences, goals and needs of the individual.

Specific recommendations in rehabilitation for older adults living with HIV

Stream A - Recommendations Derived from Evidence Specific to Rehabilitation for Older Adults with HIV (HIV, Aging and Rehabilitation)

The following recommendations specific to HIV, rehabilitation and older adults serve as the contextual backdrop to providing rehabilitation care, treatment and support with older adults living with HIV.

We offer **16 recommendations** derived from evidence specific to rehabilitation for older adults with HIV combined with PLHIV and clinician values and preferences for clinicians to consider when working with older adults living with HIV. We include the level of evidence and citations from which each recommendation was derived. Some of the recommendations have additional explanatory notes to further explain the context and PLHIV and clinician values.

The recommendations are organized into the following six categories:

- A)** Preparedness of rehabilitation professionals
- B)** Approaches to rehabilitation assessment and treatment of older adults living with HIV
- C)** Extrinsic factors to consider with rehabilitation of older adults living with HIV
- D)** Intrinsic factors to consider with rehabilitation of older adults living with HIV
- E)** Rehabilitation approaches and
- F)** Rehabilitation interventions

Category A

Preparedness of Rehabilitation Professionals

Recommendation 1: Rehabilitation professionals should be prepared to provide care to older adults with HIV who present with **complex comorbidities** affecting neurological, cardiorespiratory and musculoskeletal systems that may result in physical, mental and social health challenges.

Level of Evidence: Low

References

Grov C, Golub SA, Parsons JT, Brennan M & Karpiak SE. Loneliness and HIV-related stigma explain depression among older HIV-positive adults. *AIDS Care - Psychological and Socio-Medical Aspects of AIDS/HIV*. 2010; 22(5): 630-639.

Vance DE, Moneyham L, Fordham P & Struzick TC. A model of suicidal ideation in adults aging with HIV. *JANAC: Journal of the Association of Nurses in AIDS Care*. 2008; 19(5): 375-384.

Vance D E. Self-rated emotional health in adults with and without HIV. *Psychological Reports*. 2006; 98(1): 106-108.

Pitts M, Grierson J & Misson S. Growing older with HIV: a study of health, social and economic circumstances for people Living with HIV in Australia over the age of 50 years. *AIDS Patient Care & Stds*. 2005; 19(7): 460-465.

Heckman TG, Heckman BD, Kochman S, Sikkema KJ, Suhr J & Goodkin K. Psychological symptoms among persons 50 years of age and older living with HIV disease. *Aging & Mental Health*. 2002; 6(2): 121-128.

Heckman TG, Kochman A & Sikkema KJ. Depressive symptoms in older adults living with HIV disease: Application of the Chronic Illness Quality of Life Model. *Journal of Mental Health and Aging*. 2002; 8(4): 267-279.

Kalichman SC, Heckman T, Kochman A, Sikkema K & Bergholte J. Depression and thoughts of suicide among middle-aged and older persons living with HIV-AIDS. *Psychiatric Services*. 2000; 51(7): 903-907.

Heckman TG, Kochman A, Sikkema KJ & Kalichman SC. Depressive symptomatology, daily stressors, and ways of coping among middle-age and older adults living with HIV disease. *Journal of Mental Health and Aging*. 1999; 5(4): 311-322

Gutheil IA & Chichin ER. AIDS, older people, and social work. *Health & Social Work*. 1991; 16(4): 237-244.

Category
B

Approaches to rehabilitation assessment and treatment of older adults with HIV

Recommendation 2: Rehabilitation professionals should adopt an individualized approach to assessment and treatment of older adults living with HIV to fully understand the **unique and complex needs of older adults with HIV**. This approach should consider the intersections between **personal and social attributes** (race, gender, sexual orientation, ethnocultural background and socioeconomic status) and the **broader determinants of health** (housing, access to health care, poverty, racism, financial supports, income support, education, work and parenting roles).

Explanatory Notes: Rehabilitation professionals should consider the uniqueness of HIV care provision and the need to be flexible in their approach working with older adults with HIV.

Evidence provides information about how personal attributes of older adults living with HIV including age, sexual orientation, gender, race and comorbidities (or concurrent health conditions) may further increase the complexity of HIV and aging. Consideration of the broader determinants of health within the context of the complex personal attributes are required for considering the unique needs of older adults with HIV to enhance the rehabilitation process.

Level of Evidence: Low

References

Plach SK, Stevens PE & Keigher S. Self-care of women growing older with HIV and/or AIDS. *Western Journal of Nursing Research*. 2005; 27(5): 534-553.

Emler CA. HIV/AIDS and Aging: A Diverse Population of Vulnerable Older Adults. *Journal of Human Behavior in the Social Environment*. 2004; 9(4): 45-63.

Keigher SM, Stevens PE & Plach SK. Midlife women with HIV: health, social, and economic factors shaping their futures. *Journal of HIV/AIDS & Social Services*. 2004; 3(1): 43-58.

Emler CA & Farkas KJ. A descriptive analysis of older adults with HIV/AIDS in California. *Health & Social Work*. 2001; 26(4): 226-234.

Heckman TG, Kochman A, Sikkema KJ, Kalichman SC, Masten J & Goodkin K. Late middle-aged and older men living with HIV/AIDS: race differences in coping, social support, and psychological distress. *Journal of the National Medical Association*. 2000; 92(9): 436-444.



B.1) Physical and Mental Health Assessment

Recommendation 3: Rehabilitation professionals should consider assessing a **diversity of physical and mental health outcomes during assessment**, which include but are not limited to, disability, quality of life, stress, coping, anxiety and depression, retirement and financial issues, sexual and familial relationships, loneliness and social networks, cognition, and daily function.

Level of Evidence: Very low

References

Senior K. Growing old with HIV. *The Lancet Infectious Diseases*. 2005; 5(12): 739.

B.2) Physical health (aerobic capacity)

Recommendation 4: Rehabilitation professionals should assess both **physical impairment and functional activity** with older adults living with HIV (such as limitations in aerobic capacity).

Level of Evidence: Very low

References

Oursler KK, Katzel LI, Smith BA, Scott WB, Russ DW & Sorkin JD. Prediction of cardiorespiratory fitness in older men infected with the human immunodeficiency virus: clinical factors and value of the six-minute walk distance. *Journal of the American Geriatrics Society*. 2009; 57(11): 2055-2061.

Oursler KK, Sorkin JD, Smith BA & Katzel LI. Reduced aerobic capacity and physical functioning in older HIV infected men. *AIDS Research & Human Retroviruses*. 2006; 22(11): 1113-1121.

B.3 - Mental Health

Recommendation 5: Rehabilitation professionals should incorporate **mental health assessment and treatment** into the care of older adults with HIV as they are at risk of experiencing low mood, anxiety, depression, and suicide ideation.

Explanatory Notes: Rehabilitation professionals need to be aware of stressors that impact overall health, quality of life, coping, the ability to carry out daily activities, and social inclusion. Mental health interventions that enhance the coping abilities of older adults with HIV, especially those with elevated levels of psychological distress, are urgently needed. Those who are aging with HIV may be particularly vulnerable to negative affect and emotional challenges of dealing with HIV.

Level of Evidence: Low

References

Grov C, Golub SA, Parsons JT, Brennan M & Karpiak SE. Loneliness and HIV-related stigma explain depression among older HIV-positive adults. *AIDS Care - Psychological and Socio-Medical Aspects of AIDS/HIV*. 2010; 22(5): 630-639.

Vance DE, Moneyham L, Fordham P & Struzick TC. A model of suicidal ideation in adults aging with HIV. *JANAC: Journal of the Association of Nurses in AIDS Care*. 2008; 19(5): 375-384.

Vance DE. Self-rated emotional health in adults with and without HIV. *Psychological Reports*. 2006; 98(1): 106-108.

Heckman TG, Kochman A & Sikkema KJ. Depressive symptoms in older adults living with HIV disease: Application of the Chronic Illness Quality of Life Model. *Journal of Mental Health and Aging*. 2002; 8(4): 267-279.

Heckman TG, Heckman BD, Kochman A, Sikkema KJ, Suhr J & Goodkin K. Psychological symptoms among persons 50 years of age and older living with HIV disease. *Aging & Mental Health*. 2002; 6(2): 121-128.

Kalichman SC, Heckman T, Kochman A, Sikkema K & Bergholte J. Depression and thoughts of suicide among middle-aged and older persons living with HIV-AIDS. *Psychiatric Services*. 2000; 51(7): 903-907.

Heckman TG, Kochman A, Sikkema KJ & Kalichman SC. Depressive symptomatology, daily stressors, and ways of coping among middle-age and older adults living with HIV disease. *Journal of Mental Health and Aging*. 1999; 5(4): 311-322.

B.4 - Neurocognitive Screening

Recommendation 6: Rehabilitation professionals should conduct regular **neurocognitive screening** with older adults living with HIV, and where indicated, conduct complete assessments to identify early signs of HIV-associated executive functioning deficits (e.g. ability to keep appointments, adhere to medication regimens, and follow-up on recommendations) and interventions to effectively prevent, reduce or compensate for cognitive impairments.

Explanatory Notes: Early and ongoing assessment of neurocognition among older adults living with HIV may promote early rehabilitation interventions helpful for improving cognitive function or preventing further deterioration. However, weak evidence exists for suggesting optimal methods to assess mild to moderate neurocognitive impairment and the optimal rehabilitation interventions that may address these impairments specifically to older adults living with HIV.

Level of Evidence: Low

References

Vance DE & Struzick TC. Addressing risk factors of cognitive impairment in adults aging with HIV: a social work model. *Journal of Gerontological Social Work*. 2007; 49(4): 51-77.

Vance DE & Burrage Jr JW. Promoting successful cognitive aging in adults with HIV: Strategies for intervention. *Journal of Gerontological Nursing*. 2006; 32(11):34-41.



Vance DE & Burrage Jr JW. Cognitive complaints in adults aging with HIV: a pilot study. Physical & Occupational Therapy in Geriatrics. 2005; 24(2): 35-51.

Neundorfer MM, Camp CJ, Lee MM, Skrajner MJ, Malone ML & Carr JR. Compensating for cognitive deficits in persons aged 50 and over with HIV/AIDS, Journal of HIV/AIDS & Social Services. 2004; 3(1): 79-97.

Lee MM & Camp CJ. Clinical comments. Spaced retrieval: a memory intervention for HIV+ older adults. Clinical Gerontologist. 2001; 22(3/4): 131-135.

B.5) Uncertainty

Recommendation 7: Rehabilitation professionals should be aware of the potential impact of **uncertainty** among older adults with HIV and the psychological importance for some older adults to know the source of their symptoms (age-related versus HIV-related versus medication-related).

Level of Evidence: Low

References

Siegel K, Dean L & Schrimshaw EW. Symptom ambiguity among late-middle-aged and older adults with HIV. Research on Aging. 1999; 21(4): 595-618.

B.6) Social Inclusion

Recommendation 8: Rehabilitation professionals should consider the risk of **social exclusion** older adults with HIV may face in relation to race, ethnicity, gender, and sexual orientation, in addition to their HIV status, in their assessment.

Explanatory Notes: Older adults living with HIV are at risk of social exclusion, dependent on personal and environmental factors.

Level of Evidence: Low

References

Emler CA. An examination of the social networks and social isolation in older and younger adults living with HIV/AIDS. Health & Social Work. 2006; 31(4): 299-308.

Category
C

Extrinsic Factors to consider with rehabilitation of older adults living with HIV

C.1) Ageism and Stigma

Recommendation 9: Rehabilitation professionals should be knowledgeable of **ageism** as an added layer of stigma that may increase existing HIV stigma and homophobia experienced by older adults with HIV.

Level of Evidence: Low

References

Older HIV patients deal with the double stigma of having the disease and being old. Big worry: 'Will I get to see grandkids if I tell?'. AIDS Alert. 2007; 22(2): 16-17.

Poindexter CC. Six champions speak about being over 50 and living with HIV. Journal of HIV/AIDS & Social Services. 2004; 3(1): 99-117.

C.2) HIV Disclosure

Recommendation 10: Rehabilitation professionals should understand the implications of **HIV disclosure** among older adults with HIV, be respectful of individualized choice surrounding disclosure, the potential social, legal and financial implications of disclosure, and be prepared to discuss ways to ensure clients obtain the necessary supports surrounding disclosure.

Explanatory Notes: Issues surrounding disclosure will be increasingly important as older adults with HIV enter long term care environments with increasing complexities with stigma having implications for disclosure.

Level of Evidence: Low

References

Poindexter C & Shippy RA. Networks of older New Yorkers with HIV: fragility, resilience, and transformation. AIDS Patient Care & Stds. 2008; 22(9): 723-733.

Shippy RA. Taking care of each other. GMHC treatment issues : the Gay Men's Health Crisis newsletter of experimental AIDS therapies. 2007; 21(2): 7-8.

Schrimshaw EW & Siegel K. Perceived barriers to social support from family and friends among older adults with HIV/AIDS. Journal of Health Psychology. 2003; 8(6): 738-752.



C.3) Social Support

Recommendation 11a: Rehabilitation professionals should be knowledgeable about the importance of social relationships and the need for **emotional and practical social support** to maximize physical, mental and psychological well-being for older adults with HIV.

Recommendation 11b: Rehabilitation professionals should recognize the **emotional and practical barriers to social support** that may exist within 'family' and 'support networks' among older adults with HIV.

Recommendation 11c: Rehabilitation professionals should recognize the **supportive obligations** that older adults with HIV may have to family, friends and fellow people with HIV and how this might impact their overall health.

Explanatory Notes: There may be a variable composition of 'family' and 'support networks' among older adults with HIV as HIV positive older adults may form essential networks with others living with HIV for support and grief. These networks may be simultaneously vulnerable and durable.

Level of Evidence: Low

References

Mavandadi S, Zanjani F, Ten Have TR & Oslin DW. Psychological well-being among individuals aging with HIV: the value of social relationships. *Journal of Acquired Immune Deficiency Syndromes: JAIDS*. 2009; 51(1): 91-98.

Poindexter C & Shippy RA. Networks of older New Yorkers with HIV: fragility, resilience, and transformation. *AIDS Patient Care & Stds*. 2008; 22(9): 723-733.

Shippy RA. Taking care of each other. GMHC treatment issues : the Gay Men's Health Crisis newsletter of experimental AIDS therapies. 2007; 21(2): 7-8.

Shippy R & Karpiak SE. Perceptions of Support Among Older Adults With HIV. *Research on Aging*. 2005; 27(3): 290-306.

Chesney MA, Chambers DB, Taylor JM & Johnson LM. Social support, distress, and well-being in older men living with HIV infection. *Journal of Acquired Immune Deficiency Syndromes: JAIDS*. 2003; 33 Suppl 2: S185-193.

Schrimshaw EW & Siegel K. Perceived barriers to social support from family and friends among older adults with HIV/AIDS. *Journal of Health Psychology*. 2003; 8(6): 738-752.

Malone MA. HIV-positive women over fifty: how they cope. *AIDS Patient Care & Stds*. 1998; 12(8): 639-643.

Category
D

Intrinsic Factors to consider with rehabilitation of older adults living with HIV

D.1) Self-Management

Recommendation 12: Rehabilitation professionals should consider the role of **self-management strategies** to promote health and wellness among older adults living with HIV.

Level of Evidence: Low

References

Plach SK, Stevens PE & Sharon K. Self-care of women growing older with HIV and/or AIDS. *Western Journal of Nursing Research*. 2005; 27(5): 534-553.

Heckman TG, Kochman A, Sikkema KJ, Kalichman SC, Masten J & Goodkin K. Late middle-aged and older men living with HIV/AIDS: race differences in coping, social support, and psychological distress. *Journal of the National Medical Association*. 2000; 92(9): 436-444.

D.2) Spirituality

Recommendation 13: Rehabilitation professionals may consider the importance and role of **spirituality** in the health of older adults with HIV depending on the individual.

Explanatory Notes: The importance of spirituality among older adults living with HIV care may vary based on religious and ethnocultural background and may be complex, balanced with potential benefits of social support and challenges to social inclusion.

Level of Evidence: Very low

References

Hines ME. Commentary on "biopsychosocial benefits of spirituality in adults aging with HIV: implications for nursing practice and research". *New challenges for providing spiritual care in aging patients with HIV*. *Journal of Holistic Nursing*. 2008; 26(2): 126-127.

Ackerman, M. Religiosity and Biopsychosocial Outcomes in HIV: A SEM Comparison of Gender, Race, and Sexual Orientation. *Southern Online Journal of Nursing Research*. 2008; 8(4) at: [http://www.resourcenter.net/images/snrs/files/sojnr_articles2/Vol08Num04A.html#Ackerman.\(2008\).](http://www.resourcenter.net/images/snrs/files/sojnr_articles2/Vol08Num04A.html#Ackerman.(2008).) "2008 SNRS abstracts -- A." *Southern Online Journal of Nursing Research* 8(4): 1-1.

Vance DE & Woodley RA Strengths and distress in adults who are aging with HIV: a pilot study. *Psychological Reports*. 2005; 96(2): 383-386.

Vance DE & Robinson FP. Reconciling successful aging with HIV: a biopsychosocial overview. *Journal of HIV/AIDS & Social Services*. 2004; 3(1): 59-78.



Category E

Rehabilitation Approaches

E.1) Interprofessional Practice

Recommendation 14: Rehabilitation professionals should use an **interprofessional approach to practice** that is **sensitive** to the unique and individualized values and preferences of older adults with HIV while considering issues of culture, stigma and discrimination. Specifically rehabilitation professionals should **communicate** information surrounding care, treatment and education in a way that is **tailored to the specific needs** of older adults with HIV to optimize physical and mental health and well-being.

Level of Evidence: Low to very low

References

Shippy RA & Karpiak SE. The aging HIV/AIDS population: fragile social networks. *Aging & Mental Health*. 2005; 9(3): 246-254.

Hillman JL & Stricker G. Some issues in the assessment of HIV among older adult patients. *Psychotherapy*. 1998; 35 (4): 483-489.

E.2) Complementary and Alternative Medicine

Recommendation 15: Rehabilitation professionals should inquire about the nature and extent to which older adults with HIV use **complementary and alternative medicine (CAM)** and consider the potential benefits and side effects of CAM interventions.

Explanatory Notes; Lifestyle strategies might include use of complementary and alternative medicines and therapies. Given the high number of older adults with HIV taking complementary and alternative medicine (CAM) in combination or in lieu of antiretrovirals, it is important for rehabilitation professionals to consider the use of CAM among older adults living with HIV.

Level of Evidence: Low

References

Wutoh AK, Brown CM, Kumoji EK, Daftary MS, Jones T, Barnes NA & Powell NJ. Antiretroviral adherence and use of alternative therapies among older HIV-infected adults. *Journal of the National Medical Association*. 2001; 93(7-8): 243-250.

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Category
F

Rehabilitation Interventions

Recommendation 16: Exercise (specifically progressive resistive exercise) may be recommended for associated improvements in strength, body composition, and physical fitness in older adults living with HIV. Specifically, resistive exercise may be considered for use among older adults who are frail to increase muscle strength and mitigate wasting.

Explanatory Notes: A paucity of rehabilitation intervention evidence existed specific to older adults living with HIV. Exercise was one intervention where although there was low level evidence comprised of a prospective single group study design, this recommendation was highly GRADED by the synthesis team. Evidence on neurocognitive interventions such as space retrieval and teleconferencing support interventions also existed suggesting that group cognitive interventions focused on increasing adaptive coping and social support may help to improve the health-related quality of life of older adults living with HIV and that teleconferencing support or coping group interventions may help to improve psychological well-being, however these too were low levels of evidence and these interventions were not highly GRADED by the synthesis team. Concerns were raised in highlighting these interventions over other interventions used in clinical practice only because there was some form of evidence published in this area. As a result, we refrained from developing specific recommendations for rehabilitation interventions that did not have evidence and were not strongly graded by the team.

Level of Evidence: Low

References

de Souza PML, Filho WJ, Santarem JM, da Silva AR, Li HY & Burattini MN. Progressive resistance training on elderly HIV+ patients: Does it work? American Journal of Infectious Diseases. 2008; 4(4): 215-219.

Evans WJ, Roubenoff R & Shevitz A. Exercise and the treatment of wasting: aging and human immunodeficiency virus infection. Seminars in Oncology. 1998; 25(2 Suppl 6): 112-122.

Additional References (interventions not included in the specific recommendations)

Heckman TG, Barcikowski R, Ogles B, Suhr J, Carlson B, Holroyd K & Garske J. A Telephone-Delivered Coping Improvement Group Intervention for Middle-Aged and Older Adults Living With HIV/AIDS. Annals of Behavioral Medicine. 2006; 32(1): 27-38.

Nokes KM, Chew L & Altman C. Using a telephone support group for HIV-positive persons aged 50+ to increase social support and health-related knowledge. AIDS Patient Care & Stds. 2003; 17(7): 345-351.

Heckman TG, Kochman A, Sikkema KJ, Kalichman SC, Masten J, Bergholte J & Catz S. A pilot coping improvement intervention for late middle-aged and older adults living with HIV/AIDS in the USA. AIDS Care. 2001; 13(1): 129-139.

Lee MM & Camp CJ. Clinical comments. Spaced retrieval: a memory intervention for HIV+ older adults. Clinical Gerontologist. 2001; 22(3/4): 131-135.



Specific recommendations in rehabilitation for older adults living with HIV

Stream B- Recommendations for Rehabilitation Interventions for Older Adults with HIV who may experience Common Comorbidities

The following recommendations serve as a guide for rehabilitation interventions with older adults living with HIV who may be living with common comorbidities. No guidelines exist on rehabilitation interventions specific to older adults with HIV and comorbidities. While high level evidence exists for exercise and HIV, these systematic reviews were not specifically focused with older adults with HIV.

For Stream B, we included systematic reviews or meta-analyses so the rating of the evidence was either high (systematic reviews published in the Cochrane Library) or moderate (other systematic reviews or meta-analyses not published in the Cochrane Library). However, the wording of our recommendation depended on how well or to what extent we could make the leap from the condition-specific evidence to a recommendation for rehabilitation specific to older adults living with HIV and these conditions. Hence, PLHIV and clinician values and preferences were integral to determining the strength of the recommendation, based on whether the recommendation made sense clinically and experientially for older adults living with HIV and that the intervention posed minimal risk or harm to older adults living with HIV.

We offer **36 recommendations** that include specific considerations when applying rehabilitation interventions for adults living with HIV. We then indicate the level of evidence and citations of evidence (references) from which the recommendations were derived. Given this synthesis was not specific to older adults, we also provide the age of participants represented in the evidence, to help clinicians determine the applicability of the recommendation to older adults with HIV.

The recommendations are presented based on interventions across 10 categories specific to:

A) Older adults

B) HIV/AIDS

And eight comorbidities that may be experienced by older adults with HIV:

C) Bone and joint disorders

D) Cancer

E) Stroke

F) Cardiovascular disease

G) Mental health challenges

H) Cognitive impairments

I) Chronic Obstructive Pulmonary Disease (COPD) and

J) Diabetes

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2 For each comorbidity, we provide a background on the prevalence and incidence of the condition
3 among people living with HIV, and the nature of disability that may be experienced by adults living
4 with HIV and these comorbidities.
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For peer review only



Category

A

Older Adults Living with HIV

The prevalence of older adults with HIV in Canada and the United States is increasing. As of 2008, approximately 10% of Canadians living with HIV were older adults (50 years or older). In Canada, the rate of new HIV positive reports for older adults increased from 11% in 1999 to 15% in 2008 (1).

In 2005, the prevalence of older adults living with HIV, 50 years and older in the United States was 24%. Older adults accounted for 15% of all new HIV cases in 2005 (2)

Among Canadians living with HIV 50 years and older in 2005, the majority was men (86%), white (74%), 13% were Aboriginal and 6% were of African descent (1). Newly reported HIV positive cases for women ages 50 years and older increased from 11% between 1985-1996 to approximately 16% between 1997- 2008 (1).

Among adults living with HIV, 50 years and older, 18% reported having one comorbidity, 28% reported having two, and 54% reported having three or more (3). Over 50% of older adults living with HIV reported taking antiretroviral therapy (3). Long-term antiretroviral therapy may be associated with several metabolic and anatomic complications, including abnormal or degenerative conditions of the body's adipose tissue (lipodystrophy), insulin resistance, diabetes, kidney disease and an abnormal amount of lipids in the blood (dyslipidemia) (3-6).

Disability Experienced by Older Adults with HIV

Challenges faced by adults living with HIV, 50 years and over may include low bone mass density (which increases the risk of osteoporotic fractures), fatigue, weight loss, night sweats and diminished appetite (4, 7-10). Comorbidities such as cardiovascular disease, osteoporosis, decline of renal function, liver disease and dementia are more common among older adults living with HIV and can complicate the disease process and management (4, 11, 12).

We present three recommendations for exercise and occupational therapy for older adults living with HIV.

A.1 – Exercise

Recommendation 17: Regular forms of exercise including (strength/resistance training, aerobic/cardiovascular endurance training, and balance/stability training) may be strongly recommended for older adults with HIV who are medically stable to reduce fall rates, improve functional and physical performance, improve cardiopulmonary fitness, reduce depressive symptoms, and improve mood and quality of life.

Specifically:

Recommendation 17a: Exercise-specific interventions involving **gait, balance, co-ordination and functional exercises, and muscle strengthening** is strongly recommended for its beneficial effect on balance.

Recommendation 17b: Aerobic exercise is strongly recommended to improve cardiorespiratory fitness and may also be beneficial for cognitive function specifically improvements in motor function, cognitive speed, auditory and visual attention.

Recommendation 17c: Progressive resistive exercise two to three times a week may be recommended to improve physical function. Clients should be monitored as evidence suggests adverse effects might occur in older people at higher risk of injury (i.e. frail or recently ill older people).

Recommendation 17d: Home-based exercise programs may be recommended for those who are medically stable as evidence suggests home-based exercise may be just as beneficial to centre-based exercise (rehabilitation) programs.

Level of Evidence: High (combination of Cochrane systematic reviews and meta-analyses - not Cochrane)

Age of Participants in Research Evidence: >50 years (and >60 years in majority of evidence)

References

Liu CJ & Latham NK. Progressive resistance strength training for improving physical function in older adults. *Cochrane Database of Systematic Reviews* 2009, Issue 3. Art. No.: CD002759. DOI: 10.1002/14651858.CD002759.pub2.

Angevaren M, Aufdemkampe G, Verhaar HJJ, Aleman A & Vanhees L. Physical activity and enhanced fitness to improve cognitive function in older people without known cognitive impairment. *Cochrane Database of Systematic Reviews* 2008, Issue 3. Art. No.: CD005381. DOI: 10.1002/14651858.CD005381.pub3.

Gu MO & Conn VS. Meta-analysis of the effects of exercise interventions on functional status in older adults. *Research in Nursing & Health*. 2008; 31(6): 594–603 [Published online 10 June 2008 in Wiley InterScience]. DOI: 10.1002/nur.20290.

Baker MK, Atlantis E & Fiatarone Singh MA. Multi-modal exercise programs for older adults: systematic review. *Age and Ageing*. 2007; 36(4): 375–381. DOI:10.1093/ageing/afm054.

de Morton N, Keating JL & Jeffs K. Exercise for acutely hospitalised older medical patients. *Cochrane Database of Systematic Reviews* 2007, Issue 1. Art. No.: CD005955. DOI: 10.1002/14651858.CD005955.pub2.



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3 Howe TE, Rochester L, Jackson A, Banks PMH & Blair VA. Exercise for improving balance in older people.
4 *Cochrane Database of Systematic Reviews* 2007, Issue 4. Art. No.: CD004963. DOI:
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8 Sjosten N & Kivela SL. The effects of physical exercise on depressive symptoms among the aged: a
9 systematic review. *International Journal of Geriatric Psychiatry*. 2006; 21(5): 410-418.
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11 Ashworth NL, Chad KE, Harrison EL, Reeder BA & Marshall SC. Home versus center based physical activity
12 programs in older adults. *Cochrane Database of Systematic Reviews* 2005, Issue 1. Art.No.: CD004017. DOI:
13 10.1002/14651858.CD004017.pub2.
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15 Huang G, Gibson CA, Tran ZV & Osness WH. Controlled endurance exercise training and VO2max changes in
16 older adults: a meta-analysis. *Preventive Cardiology*. 2005; 8(4): 217-225.
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18 Arent SM, Landers DM & Etnier JL. The effects of exercise on mood in older adults: a meta-analytic review.
19 *Journal of Aging and Physical Activity*. 2000; 8(4):407-430.
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22 A.2 – Rehabilitation

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24 **Recommendation 18: Multidisciplinary forms of rehabilitation is strongly recommended**
25 **for older adults with HIV who are hospitalized to promote earlier discharge directly home**
26 **from hospital and reduced costs associated with hospitalization.**
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30 **Level of Evidence:** High (combination of Cochrane systematic reviews and meta-analyses - not Cochrane)
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32 **Age of Participants in Research Evidence:** >50 years (and >60 years in majority of evidence)
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22
23 **A.3 – Occupational Therapy**

24 **Recommendation 19: Occupational therapy** may be an important component of
25 rehabilitation for older adults living with HIV with functional impairments and is strongly
26 recommended for elderly community dwellers, specifically for advising on adaptive
27 devices; mobility devices; energy conservation; cognitive training; training of skills to use
28 adaptive devices to enhance functional ability, and to enhance social participation and
29 quality of life.
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32

33 **Level of Evidence:** Moderate (systematic review but not Cochrane)
34

35 **Age of Participants in Research Evidence:** >60 years
36

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Category

B

HIV/AIDS

We present one recommendation for exercise specific to older adults living with HIV.

Recommendation 20: Aerobic and resistive exercise may be recommended for at least 20 minutes at least 3 times per week for at least 5 weeks for older adults living with HIV who are medically stable with the potential to maintain or enhance outcomes of cardiopulmonary fitness, weight and body composition, strength, and quality of life.

Explanatory Notes: Although this recommendation was derived from high level evidence on HIV and exercise, the evidence is not specific to older adults with HIV. Clinicians are encouraged to use this recommendation in combination with the exercise recommendation #16 that was derived from lower level evidence, but specifically to older adults with HIV.

Level of Evidence: High (Cochrane systematic reviews)

Age of Participants in Research Evidence: Age range 18-66 years

References

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Category
C

Bone and Joint Disorders

The prevalence of low bone mineral density (BMD) among older adults living with HIV ranges from 27%-39%; and the prevalence of osteoporosis is 15% - 16% which is 4 times greater than adults without HIV. Prevalence rates for osteopenia are 20-52% and 4% for osteonecrosis (7, 13-16).

HIV infection has been independently linked to decreased BMD among men and women (10, 13). Men ages 50 years and older in general have low BMD, but this levels of BMD are lower among older men living with HIV compared to men in the same age group living without HIV (10). The prevalence of low peak bone mass are higher among women living with HIV compared to women who are not living with HIV, younger in age, have a moderate to high body weight, no history of bone fractures and who has or is currently using estrogen (13).

Lifestyle factors among people living with HIV associated with low peak bone mass include cigarette smoking (10, 17). With an increasing prevalence of smoking among people living with HIV, the prevalence of osteoporosis may increase among this population (4, 18).

Ethnicity is a genetic factor strongly associated with BMD (13). People of African descent have higher BMD and a lower risk of developing osteoporosis compared to the rest of the population, but the presence of an HIV infection can reduce BMD and increase risk of osteoporotic fractures regardless of ethnicity (13).

Rheumatic Disorders are medical problems affecting the joints and connective tissue (19). They include spondyloarthropathic arthritis, also known as Reiter’s syndrome which has a prevalence rate ranging from 5-10% among adults with HIV (19). The prevalence rate for psoriatic arthritis is 1-32% among adults living with HIV (19).

Disability Experienced by Adults with Bone and Joint Disorders

Challenges faced by adults living with HIV with bone and joint disorders include prolonged periods of immobility (decreased activity levels), increased bone loss, reduced weight bearing, decreased joint range-of-motion, and pain in joints and areas closest to joint (13, 16, 19).

Low BMD in the femoral neck and lumbar spine increases the risk of osteoporotic fractures for women living with HIV (13). Older men living with HIV with low BMD have increased chances of fractures and hospitalization from fracture (7, 10). Fractures can lead to activity limitations (such as decreased mobility) as well as social participation restrictions.

We present four recommendations for exercise, rehabilitation and self-management interventions for older adults living with HIV and bone and joint disorders.



C.1 – Exercise

Recommendation 21a: Supervised exercise sessions should be recommended to older adults living with HIV with knee and/or hip osteoarthritis (OA) who are medically stable to improve pain and physical function.

Explanatory Notes: Evidence more strongly suggests improvements with knee osteoarthritis (OA) rather than hip OA. Exercise programs that involve more than 12 directly supervised sessions may be associated with greater improvements in knee pain and physical function. While this evidence was not specific to older adults with knee or hip OA, it did include older adults with OA in the systematic review.

Recommendation 21b: A combination of low impact exercise in the form of jogging, stair climbing and walking, combined with high-magnitude resistance training should be recommended for older adults with HIV to preserve bone mineral density.

Explanatory Notes: Evidence is specific to postmenopausal women, but there is no reason that men may not benefit from these exercise interventions as well.

Level of Evidence: High (knee OA) to moderate (hip OA) (systematic review but not Cochrane)

Age of Participants in Research Evidence: >50 years

References

Fransen M & McConnell S. Exercise for osteoarthritis of the knee. *Cochrane Database of Systematic Reviews* 2008, Issue 4. Art. No.: CD004376. DOI: 10.1002/14651858.CD004376.pub2. Available from: <http://onlinelibrary.wiley.com/doi/10.1002/14651858.CD004376.pub2/pdf>

Fransen M & McConnell S, Hernandez-Molina G, Reichenbach S. Exercise for osteoarthritis of the hip. *Cochrane Database of Systematic Reviews* 2009, Issue 3. Art. No.: CD007912. DOI: 10.1002/14651858.CD007912. Available from: <http://onlinelibrary.wiley.com/doi/10.1002/14651858.CD007912/full>

Martyn-St James M & Carroll S. A meta-analysis of impact exercise on postmenopausal bone loss: The case for mixed loading exercise programmes. *Br J Sports Med*. 2009; 43(12): 898-908. Originally published online November 3, 2008. DOI: 10.1136/bjsm.2008.052704. Available from: <http://bjsportmed.com/content/43/12/898.abstract>.

Recommendation 22: Balance and strengthening exercises should be part of an overall exercise program to decrease falls and risk of fall-related fractures for older adults with HIV and low bone mineral density (BMD).

Explanatory Notes: Balance and strengthening exercises are important for overall aging and older adults but particularly for older adults with HIV who may have nutritional challenges and issues with muscle-wasting. Balance training is also particularly important for older adults with HIV who may have peripheral neuropathy resulting in balance impairments placing them at increased risk for falls.

Level of Evidence: Moderate (systematic review but not Cochrane)

Age of Participants in Research Evidence: >50 years

References

de Kam D, Smulders E, Weerdesteyn V & Smits-Engelsman BC. Exercise interventions to reduce fall-related fractures and their risk factors in individuals with low bone density: a systematic review of randomized controlled trials. *Osteoporosis International*. 2009; 20(12): 2111-212. DOI: 10.1007/s00198-009-0938-6.

C.2 - Rehabilitation

Recommendation 23: Multidisciplinary rehabilitation teams comprised of an occupational therapy (OT) and physical therapy (PT) across the **continuum of care** should be recommended for older adults with HIV who sustain a hip fracture. Specifically, **inpatient geriatric rehabilitation programs** are strongly recommended and may be an ideal intervention as they have the potential to reduce nursing home admission, mortality and improve functional status.

Explanatory Notes: Weak evidence exists on the effect of rehabilitation interventions for older adults post hip fracture on physical, psychosocial outcomes, mortality and length of stay. Limitations in the evidence are related to the large variability in interventions and outcomes assessed.

Level of Evidence: Moderate (systematic review but not Cochrane)

Age of Participants in Research Evidence: >50 years

References

Bachmann S, Finger C, Huss A, Egger M, Stuck AE & Clough-Gorr KM. Inpatient rehabilitation specifically designed for geriatric patients: systematic review and meta-analysis of randomised controlled trials. *BMJ (Clinical research ed.)*. 2010; 340: c1718. DOI: <http://dx.doi.org/10.1136/bmj.c1718>.

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Chudyk AM, Jutai JW, Petrella RJ & Speechley M. Systematic Review of Hip Fracture Rehabilitation Practices in the Elderly. *Archives of Physical Medicine and Rehabilitation*. 2009; 90(2): 246-262.

Handoll HHG, Cameron ID, Mak JCS, & Finnegan TP. Multidisciplinary rehabilitation for older people with hip fractures. *Cochrane Database of Systematic Reviews* 2009, Issue 4. Art. No.: CD007125. DOI: 10.1002/14651858.CD007125.pub2. Available from: <http://summaries.cochrane.org/CD007125/multidisciplinary-rehabilitation-of-older-patients-with-hip-fractures>.



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11 C.3 – Self-Management Programs

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13 **Recommendation 24: Self-management** programs may be considered as a component of
14 a rehabilitation program to address disability and pain for older adults living with HIV and
15 arthritis.
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18 **Explanatory Notes:** Self-management strategies may be particularly useful in the context of HIV whereby
19 there may be limitations in access to rehabilitation services for older adults with HIV.
20

21
22 **Level of Evidence:** Moderate (systematic review but not Cochrane)
23

24 **Age of Participants in Research Evidence:** Mean age 61 years
25

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Category

D

Cancer

Since the introduction of combination antiretroviral therapy the incidence of AIDS associated cancers such as Kaposi’s sarcoma (KS) and Non-Hodgkin’s Lymphoma (NHL) have declined (20).

However, incidence rates of non-AIDS associated cancers among adults living with HIV have increased, including anal cancer (43%), vaginal cancer (21%), and cervical cancer (19%) Hodgkin Lymphoma (15%), liver cancer (8%), lung cancer (3%), and melanoma cancers (3%) (20, 21). The pattern of breast cancer in adults living with HIV is unusual, as only a few cases have been reported (22, 23). Breast cancer is the most common form of cancer among women in the general population. While no increased incidence of breast cancer in women living with HIV has been identified, this form of cancer is becoming an increasingly important comorbidity for women living with HIV (22, 24).

Current evidence suggests low rates of screening for non-AIDS associated cancers among people living with HIV (24, 25).

Disability Experienced by Adults living with Cancer

Non-AIDS associated cancers can cause fatigue, weight loss, night sweats and diminished appetite (9). Symptoms of Non AIDS-associated cancers are often similar to symptoms of HIV/AIDS (25).

We present five recommendations pertaining to exercise for older adults living with HIV and general, lung, breast or metastatic cancer.

Di) - Cancer (General)

Di-1 – Exercise

Recommendation 25: A combination of aerobic and resistance exercise at moderate intensity may be recommended for older adults living with HIV and cancer to reduce cancer-related fatigue during and after treatment for cancer. Any exercise intervention should be individualized based on the targeted health outcome and cancer type.

Level of Evidence: High (Cochrane systematic review)

Age of Participants in Research Evidence: Mean age majority >50 years

References

Brown J, Huedo-Medina TB, Pescatello LS, Pescatello SM, Ferrer RA & Johnson BT. Efficacy of Exercise Interventions in Modulating Cancer-Related Fatigue among Adult Cancer Survivors: A Meta-Analysis. *Cancer Epidemiol Biomarkers Prev.* 2011; 20:123-133. DOI:10.1158/1055-9965.EPI-10-0988.



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10

11 **Recommendation 26: A combination of aerobic and resistive exercise** at least twice a
12 week for at least 2 weeks at 50-90% maximum oxygen capacity (VO₂max) intensity is safe
13 and may be recommended for older adults living with cancer for improvements in
14 physiological measures, symptoms, physical and psychosocial functioning of patients and
15 health-related quality of life. Positive effects of exercise may vary as a function of the type
16 of cancer; the stage of disease; the medical treatment; the nature, intensity, and duration
17 of the exercise program; and the lifestyle of the individual.
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22 **Level of Evidence:** Moderate (systematic review but not Cochrane)
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24 **Age of Participants in Research Evidence:** Age ranged 16-71 years
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34 Clin Oncol. 2005; 23(16): 3830-3842.
35

36 Dii) Lung Cancer

37 Dii-1- Exercise

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39 **Recommendation 27: Exercise** may be beneficial for self-empowerment and should be
40 recommended for older adults living with HIV who are also living with **lung cancer** who are
41 medically stable.
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46 **Explanatory Notes:** Weak evidence exists on the effect of exercise among adults with lung cancer. Given
47 the increasing prevalence of lung cancer as a non-AIDS related cancer for people living with HIV, the role for
48 exercise may be particularly important with respect to this recommendation. Furthermore, rehabilitation
49 professionals may want to consider their role in addressing smoking cessation among their clients living
50 with HIV.
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53 **Level of Evidence:** High (Cochrane systematic review)
54
55

Age of Participants in Research Evidence: Mean age >50 years

Reference

Solà I, Thompson EM, Subirana Casacuberta M, Lopez C & Pascual A. Non-invasive interventions for improving well-being and quality of life in patients with lung cancer. *Cochrane Database of Systematic Reviews* 2004, Issue 4. Art. No.: CD004282. DOI: 10.1002/14651858.CD004282.pub2.

Diii) Breast Cancer

Diii-1- Exercise

Recommendation 28a: Supervised aerobic exercise programs should be included during **breast cancer** treatment for the management of cancer related fatigue for older women living with HIV and breast cancer who are medically stable.

Recommendation 28b: A **combination of aerobic and resistive exercise** at least 3 times per week for at least 6 weeks, 30-40 minutes per session, at moderate intensity (e.g. rate of perceived exertion 11-13 out of 20) appears to be safe and may be recommended for older women living with HIV undergoing or who have undergone treatment for **breast cancer** and who are medically stable for potential improvements in cardiopulmonary fitness, physical functioning, fatigue, and body composition and quality of life.

Level of Evidence - High (Cochrane systematic review)

Age of Participants in Research Evidence: Mean age majority >50 years

References

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Brockow T, Markes M & Resch KL. Exercise for women receiving adjuvant therapy for breast cancer. Cochrane Database of Systematic Reviews 2006, Issue 4. Art. No.: CD005001. DOI: 10.1002/14651858.CD005001.pub2.

Ingram C, Courneya KS & Kingston D. The Effects of Exercise on Body Weight and Composition in Breast Cancer Survivors: An Integrative Systematic Review. *Oncology Nursing Forum*. 2006; 33(5): 937.

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For peer review only

Category
 E

Stroke

The prevalence of stroke among adults living with HIV between 2000 and 2006 is 11%; these rates are much higher among older women living with HIV (14%) compared to older men living with HIV (10%) (3).

The incidence of stroke among adults living with HIV has increased with the introduction of combination antiretroviral therapy; adults living with HIV are more at risk of stroke with increased age and length of time using antiretroviral therapy (26).

The incidence rate for ischemic stroke among adults living with HIV has increased to 0.2% in 2006, compared to 0.1% in 1997 (26-28). HIV/AIDS also increases the risk of hemorrhagic stroke, but the risks are higher among the younger adults living with HIV compared to older adults living with HIV (27).

Disability Experienced by Adults with Stroke

Stroke can result in hospitalization and increased risk for developing opportunistic infections (27, 28). The occurrence of stroke may result in a combination of physical, cognitive, speech and mental health impairments, activity limitations, and social participation restrictions (29).

Injuries that can be sustained from the occurrence of a stroke include pressure sores, and pain in shoulder and other areas. Injuries from falls can also occur (29). Psychological challenges faced as a result of stroke include depression, anxiety, emotionalism, and confusion (29).

We present eight recommendations for rehabilitation, cognitive rehabilitation, exercise and therapeutic modality interventions for adults with living with HIV and stroke.

E.1 – Cognitive Rehabilitation

Recommendation 29a: Inconclusive or insufficient evidence exists to derive recommendations for **cognitive rehabilitation** interventions for older adults with HIV and stroke. While cognitive rehabilitation does not appear harmful, weak evidence exists to support the use of cognitive-specific interventions to improve spatial neglect, disability, memory, and functional status for older adults who experience stroke.

Recommendation 29b: Rehabilitation professionals should implement specific task oriented training with older adults living with HIV and stroke as this approach is key to retraining skill specific tasks related to function.

Explanatory Notes: Despite the lack of strong evidence supporting cognitive rehabilitation in stroke, neurocognitive impairments are a major concern for the aging people living with HIV/AIDS (PLHIV) population. There may be specific considerations for older adults with HIV with pre-existing neurocognitive impairments and stroke. From a rehabilitation perspective it will be important to obtain a clear baseline to determine what neurocognitive issues are specific to stroke.



1
2 **Level of Evidence:** Moderate (systematic review but not Cochrane) to High (Cochrane review)

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4 **Age of Participants in Research Evidence:** Majority of mean age >50 years [#730 younger participants]

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6
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19 Park NW & Ingles JL. Effectiveness of attention rehabilitation after an acquired brain injury: a meta-analysis.
20 *Neuropsychology*. 2001; 15(2): 199-210.

E.2 – Rehabilitation

Recommendation 30: Stroke rehabilitation for older adults with HIV should be multi-disciplinary including occupational therapy, physical therapy, and speech-language pathology to improve the ability to undertake personal activities of daily living and reduce risk of deterioration in ability. Stroke rehabilitation may include the following components: therapeutic exercise, task-oriented training, gait-oriented training, balance training, strength training, wheelchair mobility, home modification, cognitive adaptation, and treatment of shoulder subluxation for those who experience a **sub-acute or post-acute stroke (within 1 year)**.

Specifically:

Recommendation 30a: Repetitive, task-related training in rehabilitation for lower limbs should be recommended to enhance functional activity, walking distance; walking speed; sit-to-stand, activities of daily living; measures of walking ability, and global motor function.

Recommendation 30b: Very early mobilization should be promoted for older adults with HIV to enhance earlier independent mobility.

Recommendation 30c: Passive sensory training (cutaneous electrical stimulation) may be recommended to improve hand function and dexterity in older adults living with HIV with stroke whereas evidence supporting improvements in spasticity and muscle strength is less convincing. Caution should be taken for this intervention for individuals with peripheral neuropathy due to altered sensation.

Recommendation 30d: Task-oriented circuit class training should be recommended to enhance gait and gait-related activities as evidence demonstrates this intervention is effective in improving walking ability, walking speed and balance however rehabilitation professionals should be aware of the potential for falls during any rehabilitation sessions and should put strategies in place to prevent against falls.

Recommendation 30e: Strength training should be recommended post stroke as it is not associated with increases in spasticity.

Level of Evidence: High (CPGs and Cochrane systematic reviews) and Moderate (systematic review but not Cochrane) to High (Cochrane review)

Age of Participants in Research Evidence: Majority of studies mean age > 50 years [2 studies had no age info] and Studies with participant >18 years

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36 analysis. *Stroke*. 2004; 35(11):2529-2539. Originally published online October 7, 2004. DOI:
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41 at home: systematic review of randomised trials. *Lancet*. 2004; 363(9406): 352-356.

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45 physical therapy on functional outcomes after stroke: what's the evidence? *Clinical Rehabilitation*. 2004;
46 18(8): 833-862.

47 48 49 **E.3 - Rehabilitation (Occupational Therapy)**

50
51 **Recommendation 31: Occupational therapy should be recommended** as a component of
52 rehabilitation for older adults living with HIV with stroke as interventions targeted towards
53 personal activities of daily living may increase activities of daily living (ADLs) and reduce
54 mortality, deterioration and dependency.

Level of Evidence: Moderate (meta-analysis and systematic reviews but not Cochrane)

Age of Participants in Research Evidence: Mean age 71 years

References

Legg L, Drummond A, Leonardi-Bee J, Gladman JRF, Corr S, Donkervoort M, Edmans J, Gilbertson L, Jongbloed L, Logan P, Sackley C, Walker M & Langhorne P. Occupational therapy for patients with problems in personal activities of daily living after stroke: systematic review of randomised trials. *BMJ*. 2007; 335(7626): 922.

Walker MF, Leonardi-Bee J, Bath P, Langhorne P, Dewey M, Corr S, Drummond A, Gilbertson L, Gladman JR, Jongbloed L, Logan P & Parker C. Individual patient data meta-analysis of randomized controlled trials of community occupational therapy for stroke patients. *Stroke*. 2004; 35(9): 2226-2232. Available from: <http://stroke.ahajournals.org/content/35/9/2226>.

E.4- Rehabilitation (Physical Therapy)

Recommendation 32: Physiotherapy comprised of a combination of interventions should be recommended for the recovery of postural control and lower limb function for older adults living with HIV following stroke.

Level of Evidence: Moderate (systematic review but not Cochrane)

Age of Participants in Research Evidence: Studies with participant >18 years

References

Pollock A, Baer G, Langhorne P & Pomeroy V. Physiotherapy treatment approaches for the recovery of postural control and lower limb function following stroke: a systematic review. *Clinical Rehabilitation*. 2007; 21(5): 395-410.

E.5 - Rehabilitation (Electromechanical and robotic gait training)

Recommendation 33: Electromechanical-assisted gait training in combination with physiotherapy may be recommended for older adults living with HIV with stroke (particularly those within 3 months post stroke) as this intervention is associated with a higher likelihood to achieve independent walking than gait training alone.

Level of Evidence: High (Cochrane systematic review)

Age of Participants in Research Evidence: Mean age 61 years



Reference

Mehrholz J, Werner C, Kugler J & Pohl M. Electromechanical-assisted training for walking after stroke. *Cochrane Database of Systematic Reviews* 2007, Issue 4. Art. No.: CD006185. DOI: 10.1002/14651858.CD006185.pub2.

E.6 – Exercise

Recommendation 34: Combined aerobic and resistive exercise should be a component of stroke rehabilitation for older adults living with HIV with stroke who are medically stable at any stage of motor recovery. Higher doses of exercise may be associated with better motor recovery. Specifically, **cardiorespiratory training** should be a component of exercise as evidence suggests speed, tolerance and independence during walking are improved. In addition, **strength training** may be a component of exercise as this can improve muscle strength in stroke patients and will not necessarily increase spasticity.

Level of Evidence: High (combination of systematic reviews and Cochrane reviews)

Age of Participants in Research Evidence: Majority of studies mean age >50 years

References

Cooke E, Mares K, Clark A, Tallis RC & Pomeroy VM. The effects of increased dose of exercise-based therapies to enhance motor recovery after stroke: a systematic review and meta-analysis. *BMC Medicine*. 2010; 8:60. Available from: <http://www.biomedcentral.com/1741-7015/8/60>.

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States RA, Pappas E & Salem Y. Overground physical therapy gait training for chronic stroke patients with mobility deficits. *Cochrane Database of Systematic Reviews* 2009, Issue 3. Art. No.: CD006075. DOI: 10.1002/14651858.CD006075.pub2.

Ada L, Dorsch S & Canning CG. Strengthening interventions increase strength and improve activity after stroke: a systematic review. *Australian Journal of Physiotherapy*. 2006; 52(4): 241-248.

Pang MYC, Eng JJ, Dawson AS & Gylfadottir S. The use of aerobic exercise training in improving aerobic capacity in individuals with stroke: a meta-analysis. *Clinical Rehabilitation*. 2006; 20(2): 97-111.

Meek C, Pollock A, Potter J & Langhorne P. A systematic review of exercise trials post stroke. *Clinical Rehabilitation*. 2003; 17(1): 6-13.

E.7 - Electrotherapeutic Modalities

Recommendation 35: Electrotherapeutic modalities in isolation are not recommended for older adults living with HIV with stroke over conventional rehabilitation interventions strategies. Very weak to no evidence exists to support the use of electrotherapeutic modalities (functional electrical stimulation, biofeedback, visual feedback therapy) over conventional physical therapy interventions alone for muscle strength recovery, upper limb recovery or balance post stroke.

Explanatory Notes: Impairment-focused interventions alone such as biofeedback, neuromuscular or transcutaneous nerve stimulation fail to generalize to functional improvements and are not recommended in isolation for older adults with HIV and stroke. Particular caution should be taken by rehabilitation professionals working with older adults with HIV who may not have complete intact sensation as they may be at risk for injury with intervention such electronic stimulation, electrotherapeutic modalities.

Level of Evidence: Moderate (systematic reviews and meta-analyses but not Cochrane)

Age of Participants in Research Evidence: Mean age >50 years and Studies with participant >18 years

References

Van Peppen RPS, Kortsmid M, Lindeman E & Kwakkel G. Effects of visual feedback therapy on postural control in bilateral standing after stroke: a systematic review. *Journal of Rehabilitation Medicine*. 2006; 38(1): 3-9.

Kottink AI, Oostendorp LJ, Buurke JH, Nene AV, Hermens HJ & IJzerman MJ. The orthotic effect of functional electrical stimulation on the improvement of walking in stroke patients with a dropped foot: a systematic review. *Artificial Organs*. 2004; 28(6): 577-586.

Van Peppen RP, Kwakkel G, Wood-Dauphinee S, Hendriks HJ, Van der Wees PJ & Dekker J. The impact of physical therapy on functional outcomes after stroke: what's the evidence? *Clinical Rehabilitation*. 2004; 18 (8): 833-862.

Glanz M, Klawansky S, Stason W, Berkey C & Chalmers TC. Functional electrostimulation in poststroke rehabilitation: a meta-analysis of the randomized controlled trials. *Archives of Physical Medicine & Rehabilitation*. 1996; 77(6): 549-553.

Moreland J & Thomson MA. Efficacy of electromyographic biofeedback compared with conventional physical therapy for upper-extremity function in patients following stroke: a research overview and meta-analysis. *Physical Therapy*. 1994; 74(6): 534-54.



Category F

Cardiovascular Disease (CVD)

HIV disease has been associated with an increased risk of cardiovascular complications (30). Dyslipidemia (abnormal amounts of lipid in the blood), insulin resistance, and central obesity coupled with an aging HIV-positive population have led to an increased incidence of cardiovascular events for adults with HIV (31).

The prevalence of hypertension among adults living with HIV ranged from 41% to 54% between 2000 and 2007 with rates higher for women compared to men in the same population (3, 16).

The prevalence of heart disease among adults living with HIV is 15%. Rates of heart disease in women (23%) is more than 2 times the rate of men living with HIV (12%) (3, 16).

The prevalence of coronary heart disease among adults living with HIV ranges from 7–8% (32).

The prevalence of asymptomatic ischemic heart disease among adults ages 50-59 years living with HIV is 13%, and increases to 17% for adults 60 years or older (33).

The prevalence of asymptomatic peripheral arterial disease (PAD) is low, but identified only in adults living with HIV with high cardiovascular risk (31).

Disability Experienced by Adults with Cardiovascular Disease (CVD)

Cardiovascular risks include abnormally elevated levels of lipids and/or lipoproteins in the blood (hyperlipidaemia), fat redistribution syndrome, insulin resistance, diabetes mellitus, hypertension and increased hospitalization (16, 30, 33, 34).

Cardiovascular disease can also lead to events such as a myocardial infarction resulting in a range of impairments, activity limitations and participation restrictions for adults with HIV.

We present six recommendations for rehabilitation and exercise interventions for older adults with HIV and cardiovascular disease, myocardial infarction, heart disease, or heart failure.

Fi) Cardiovascular Disease (CVD)

Fi.1 – Cardiac Rehabilitation

Recommendation 36: Cardiac rehabilitation in the form of **home-based or centre-based care** may be recommended because these appear equally effective in improving the clinical & health related quality of life outcomes for older adults with HIV with low risk **cardiovascular disease**. The choice of home versus centre-based care should be reflective of the individual preference of the patient as this may impact the uptake of rehabilitation.

Level of Evidence: High (Cochrane reviews) and Moderate (systematic reviews and meta-analyses but not Cochrane)

Age of Participants in Research Evidence: Majority of mean age >50 years and Mean age >55 years

References

Davies EJ, Moxham T, Rees K, Singh S, Coats AJS, Ebrahim S, Lough F & Taylor RS. Exercise based rehabilitation for heart failure. *Cochrane Database of Systematic Reviews* 2010, Issue 4. Art. No.: CD003331. DOI: 10.1002/14651858.CD003331.pub3.

Taylor RS, Dalal H, Jolly K, Moxham T & Zawada A. Home-based versus centre-based cardiac rehabilitation. *Cochrane Database of Systematic Reviews* 2010, Issue 1. Art. No.: CD007130. DOI: 10.1002/14651858.CD007130.pub2.

Clark AM, Hartling L, Vandermeer B & McAlister FA. Meta-analysis: Secondary prevention programs for patients with coronary artery. *Annals of Internal Medicine*. 2005; 143(9): 659-672. DOI: 10.7326/0003-4819-143-9-200511010-00010.

Herkner H, Thoennissen J, Nikfardjam M, Koreny M, Laggner AN & Mullner M. Short versus prolonged bed rest after uncomplicated acute myocardial infarction: a systematic review and meta-analysis. *Journal of Clinical Epidemiology*. 2003; 56(8): 775-781.

Jolliffe J, Rees K, Taylor RRS, Thompson DR, Oldridge N, & Ebrahim S. Exercise-based rehabilitation for coronary heart disease. *Cochrane Database of Systematic Reviews* 2001, Issue 1. Art. No.: CD001800. DOI: 10.1002/14651858.CD001800.

Mullen PD, Mains DA & Velez R. A meta-analysis of controlled trials of cardiac patient education. *Patient Education & Counseling*. 1992; 19(2): 143-162. DOI: 10.1016/0738-3991(92)90194-N.

Recommendation 37: Cardiac rehabilitation for older adults with HIV should include reinforcement, feedback, offer opportunity for individualization, facilitate behaviour change through skills and resources and be relevant to patients’ needs and abilities. Specifically, **motivational communication** such as formal cardiac rehabilitation program referral, reminder letters, phone calls and home visits may be recommended for increasing uptake and adherence of cardiac rehabilitation among older adults living with HIV and cardiovascular disease.

Level of Evidence: High (Cochrane reviews) and Moderate (systematic reviews and meta-analyses but not Cochrane)

Age of Participants in Research Evidence: Majority of mean age >50 years and Mean age >55 years



References

Davies EJ, Moxham T, Rees K, Singh S, Coats AJS, Ebrahim S, Lough F & Taylor RS. Exercise based rehabilitation for heart failure. *Cochrane Database of Systematic Reviews* 2010, Issue 4. Art. No.: CD003331. DOI: 10.1002/14651858.CD003331.pub3.

Taylor RS, Dalal H, Jolly K, Moxham T & Zawada A. Home-based versus centre-based cardiac rehabilitation. *Cochrane Database of Systematic Reviews* 2010, Issue 1. Art. No.: CD007130. DOI: 10.1002/14651858.CD007130.pub2.

Clark AM, Hartling L, Vandermeer B & McAlister FA. Meta-analysis: Secondary prevention programs for patients with coronary artery. *Annals of Internal Medicine*. 2005; 143(9): 659-672. DOI: 10.7326/0003-4819-143-9-200511010-00010.

Herkner H, Thoennissen J, Nikfardjam M, Koreny M, Laggner AN & Mullner M. Short versus prolonged bed rest after uncomplicated acute myocardial infarction: a systematic review and meta-analysis. *Journal of Clinical Epidemiology*. 2003; 56(8): 775-781.

Jolliffe J, Rees K, Taylor RRS, Thompson DR, Oldridge N & Ebrahim S. Exercise-based rehabilitation for coronary heart disease. *Cochrane Database of Systematic Reviews* 2001, Issue 1. Art. No.: CD001800. DOI: 10.1002/14651858.CD001800.

Mullen, PD, Mains DA & Velez R. A meta-analysis of controlled trials of cardiac patient education. *Patient Education & Counseling*. 1992; 19(2): 143-162. DOI: 10.1016/0738-3991(92)90194-N.

Fii) CVD - Myocardial Infarction**Fii.1 – Cardiac Rehabilitation**

Recommendation 38a: Exercise-based cardiac rehabilitation should be recommended for older adults with HIV who have undergone a myocardial infarction (MI) (otherwise known as a heart attack) (or at risk of an MI) given evidence suggests exercise based cardiac rehabilitation is effective in reducing cardiac deaths. The ideal frequency, intensity, time and type of exercise to maximize benefits are unclear.

Recommendation 38b: Early mobilization and rehabilitation and specifically, **secondary and tertiary prevention programs** (including counseling, education, and exercise) should be recommended to older adults living with HIV who experience an MI as these have the potential to reduce subsequent MI and mortality and improve processes of care, risk factor profiles and functional status and quality of life.

Level of Evidence: High (Cochrane reviews) and Moderate (systematic reviews and meta-analyses but not Cochrane)

Age of Participants in Research Evidence: Majority of mean age >50 years and Mean age >55 years

References

Davies EJ, Moxham T, Rees K, Singh S, Coats AJS, Ebrahim S, Lough F & Taylor RS. Exercise based rehabilitation for heart failure. *Cochrane Database of Systematic Reviews* 2010, Issue 4. Art. No.: CD003331. DOI: 10.1002/14651858.CD003331.pub3.

Taylor RS, Dalal H, Jolly K, Moxham T & Zawada A. Home-based versus centre-based cardiac rehabilitation. *Cochrane Database of Systematic Reviews* 2010, Issue 1. Art. No.: CD007130. DOI: 10.1002/14651858.CD007130.pub2.

Clark AM, Hartling L, Vandermeer B & McAlister FA. Meta-analysis: Secondary prevention programs for patients with coronary artery. *Annals of Internal Medicine*. 2005; 143(9): 659-672. DOI: 10.7326/0003-4819-143-9-200511010-00010.

Herkner H, Thoennissen J, Nikfardjam M, Koreny M, Laggner AN & Mullner M. Short versus prolonged bed rest after uncomplicated acute myocardial infarction: a systematic review and meta-analysis. *Journal of Clinical Epidemiology*. 2003; 56(8): 775-781.

Jolliffe J, Rees K, Taylor RRS, Thompson DR, Oldridge N & Ebrahim S. Exercise-based rehabilitation for coronary heart disease. *Cochrane Database of Systematic Reviews* 2001, Issue 1. Art. No.: CD001800. DOI: 10.1002/14651858.CD001800.

Mullen PD, Mains DA & Velez R. A meta-analysis of controlled trials of cardiac patient education. *Patient Education & Counseling*. 1992; 19(2): 143-162. DOI: 10.1016/0738-3991(92)90194-N.

Fiii) CVD - Coronary Artery Disease and Coronary Heart Disease

Fiii.1 – Exercise

Recommendation 39: Moderate intensity exercise (and potentially progressive resistive exercise) should be recommended for older adults with HIV with **cardiovascular disease** who are medically stable to reduce high blood pressure and potentially mitigate the effect of coronary heart disease. Exercise may be associated with improved cardiovascular health and well-being as a result of enhanced self-efficacy. More research is required to determine the ideal frequency and duration of exercise that should be recommended to see psychological improvement. **High intensity aerobic exercise** may increase High Density Lipoprotein Cholesterol (HDL-C) levels, while **combined aerobic and resistance exercise** may lower Low Density Lipoprotein Cholesterol (LDL-C) levels and should be recommended for older adults with HIV to improve their cardiovascular health.

Level of Evidence: Moderate (systematic reviews but not Cochrane)

Age of Participants in Research Evidence: Two of the studies had mean age >50 years whereas other two studies participant ranged 18-80 years



References

Valkeinen H, Aaltonen S & Kujala UM. Effects of exercise training on oxygen uptake in coronary heart disease: a systematic review and meta-analysis. *Scandinavian Journal of Medicine & Science in Sports*. 2010; 20(4): 545-555. DOI: 10.1111/j.1600-0838.2010.01133.x.

Tambalis K, Panagiotakos DB, Kavouras SA & Sidossis LS. Responses of blood lipids to aerobic, resistance, and combined aerobic with resistance exercise training: A systematic review of current evidence. *ANGIOLOGY* 2009 60: 614. Originally published online 30 October 2008. Available from: <http://ang.sagepub.com/content/60/5/614>.

Netz Y, Wu M-J, Becker BJ, & Tenebaum G. Physical activity and psychological well-being in advanced age: A meta-analysis of intervention studies. *Psychology and Aging*. 2005; 20(2): 272–284. DOI: 10.1037/0882-7974.20.2.272.

Halbert JA, Silagy CA, Finucane P, Withers RT, Hamdorf PA & Andrews GR. The effectiveness of exercise training in lowering blood pressure: a meta-analysis of randomised controlled trials of 4 weeks or longer. *Journal of Human Hypertension*. 1997; 11(10): 641-649.

Fiv) CVD – Heart Failure

Fiv.1 – Exercise

Recommendation 40: Home-based moderate intensity exercise (and potentially progressive resistive exercise) as well as supervised and hospital-based exercise programs appear to be safe and should be recommended for older adults with HIV and heart failure who are medically stable for potential improvements in cardiac function, exercise capacity (including peak oxygen consumption), physical function, mortality and quality of life and potentially a reduction in hospital admissions. Optimal session frequency, session duration, exercise intensity, program duration is unclear.

Level of Evidence: High (combination of Cochrane systematic review and other systematic reviews) and Moderate (systematic review but not Cochrane)

Age of Participants in Research Evidence: Majority of studies mean age >50 years and Age range 19-83 years (only 6/31 studies had participant >80 years)

References

Davies P, Taylor F, Beswick A, Wise F, Moxham T, Rees K & Ebrahim S. Promoting patient uptake and adherence in cardiac rehabilitation. *Cochrane Database of Systematic Reviews* 2010, Issue 7.Art.No.:CD007131. DOI: 10.1002/14651858.CD007131.pub2.

Chien C-L, Lee CM Wu Y-W, Chen T-A & Wu Y-T. Home-based exercise increases exercise capacity but not quality of life in people with chronic heart failure: a systematic review. *Australian Journal of Physiotherapy*. 2008; 54(2): 87-93.

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3 Haykowsky M, Clark AM, Liang Y, Pechter D, Jones LW & McAlister FA. A meta-analysis of the effect of
4 exercise training on left ventricular remodeling in heart failure patients: The benefit depends on the type of
5 training performed. ACC Cardiosource Review Journal. 2007; 16(10): 33-37.
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8 Smart N & Marwick TH. Exercise training for patients with heart failure: a systematic review of factors that
9 improve mortality and morbidity. American Journal of Medicine. 2004; 116(10): 693-706.
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11 Lloyd-Williams F, Mair FS & Leitner M. Exercise training and heart failure: a systematic review of current
12 evidence. British Journal of General Practice. 2002; 52(474): 47-55.
13

14 Halbert JA, Silagy CA, Finucane P, Withers RT & Hamdorf PA. Exercise training and blood lipids in
15 hyperlipidemic and normolipidemic adults: a meta-analysis of randomized, controlled trials. European
16 Journal of Clinical Nutrition. 1999; 53(7): 514-522.
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21 **Recommendation 41: Aerobic exercise (and possibly resistive exercise)** at least 3 times
22 per week may be recommended to older adults living with HIV and **hyperlipidemia** for the
23 potential to improve blood lipids. Clinical importance of the changes is unclear.
24

25 **Level of Evidence:** Moderate (systematic review but not Cochrane)
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27 **Age of Participants in Research Evidence:** Age range 19-83 years (only 6/31 studies had participant >80
28 years
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31 **Reference**

32 Halbert JA, Silagy CA, Finucane P, Withers RT & Hamdorf PA. Exercise training and blood lipids in
33 hyperlipidemic and normolipidemic adults: a meta-analysis of randomized, controlled trials. European
34 Journal of Clinical Nutrition. 1999; 53(7): 514-522.
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Category G

Mental Health Challenges

Although older adults living with HIV report more depressive symptoms and higher levels of life-stressor burden than their younger counterparts, older adults reported advanced age provided them with more adaptive coping and problem-solving skills. They also reported feeling less threatened by illness and disability compared to younger persons with HIV (16, 35, 36).

Depression in adults living with HIV is associated with neuropsychological impairment. Approximately 25% of older adults living with HIV are diagnosed with depression (36-38). The prevalence of psychological disorders (such as depression) among adults with HIV is 17%, and are more prevalent among older women living with HIV (23%) compared to older men living with HIV (14%) (3).

Disability Experienced by Adults with Mental Health Challenges

Challenges experienced by adults living with HIV and mental health issues include HIV-associated stigma, increased loneliness, decreased cognitive functioning, reduced level of energy, employment worries and reduced access to health care and social services due to AIDS-related stigma (36, 39, 40).

We present four recommendations for models of care, exercise, psychotherapy, and housing interventions for older adults living with HIV and varying forms of mental health issues.

Gi) Mental Health Challenges (Older adults with mental health issues)

Gi.1 – Models of Care

Recommendation 42: Inconclusive or insufficient evidence exists to support a recommendation for a specific model of mental health care (**acute psychogeriatric care over acute psychiatric units versus other mental health services**) for older adults with HIV living with **mental health issues**. More research is needed before recommending one model of care over another.

Level of Evidence: Moderate (systematic review but not Cochrane)

Age of Participants in Research Evidence: All participant >60 years

Reference

Draper B & Low L-F. What is the effectiveness of acute hospital treatment of older people with mental disorders? *International Psychogeriatrics*. 2005; 17(4): 539-555.

Gii) Mental Health Challenges (anxiety)

Gii.1 – Exercise

Recommendation 43: Exercise appears safe and should be recommended (approximately 30 minutes per session) to older adults with HIV living with other chronic conditions illnesses such as cardiovascular disease (CVD), cancer, chronic pain, fibromyalgia as a way to reduce symptoms of **anxiety**.

Level of Evidence: Moderate (systematic review and meta-analysis but not Cochrane)

Age of Participants in Research Evidence: Mean age 50 years

Reference

Herring MP, O'Connor PJ & Dishman RK. The effect of exercise training on anxiety symptoms among patients: a systematic review. *Archives of Internal Medicine*. 2010; 170(4): 321-331.

Giii) Mental Health Challenges (Depression)

Giii.1 – Psychotherapy

Recommendation 44: Inconclusive or insufficient evidence exists to support the use of **cognitive behavioural therapy** with older adults with HIV and **depression**.

Explanatory Notes: Despite inconclusive evidence, clinicians and PLHIV reported using this intervention in their practice with adults with HIV who are depressed.

Level of Evidence: High (Cochrane review)

Age of Participants in Research Evidence: All participants >55 years

Reference

Wilson K, Mottram PG & Vassilas C. Psychotherapeutic treatments for older depressed people. *Cochrane Database of Systematic Reviews* 2008, Issue 1. Art. No.: CD004853. DOI: 10.1002/14651858.CD004853.pub2.

Giv) Mental Health Challenges (severe mental illness)

Giv.1 – Housing Models

Recommendation 45: Supporting older adults living with HIV in securing **safe and stable housing** should be an important component of the rehabilitation process for older adults with HIV with **severe mental illness** given the positive impact of stable housing for this target population.

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Level of Evidence: Moderate (meta-analysis but not Cochrane)

Age of Participants in Research Evidence: Younger adults (mean age 39 years)

Reference

Leff HS, Chow CM, Pepin R, Conley J, Allen IE & Seaman CA. Does one size fit all? What we can and can't learn from a meta-analysis of housing models for persons with mental illness. *Psychiatric Services*. 2009; 60(4): 473-482.

For peer review only



Category
H

Cognitive Impairments

As many as 50% of adults living with HIV report cognitive difficulties, which can be associated with neuropsychological impairment (41, 42).

HIV-associated neurocognitive disorders (HAND) has been divided into three subclasses: asymptomatic neurocognitive impairments, mild neurocognitive disorder and HIV-associated dementia (HAD) (43). The prevalence of HIV-associated dementia (HAD) ranges from 8-15% for older men and women living with HIV (44, 45). Approximately 15% of adults living with HIV have Minor Cognitive Motor Disorder (MCMD) (46).

The process of neurological decline similar to Alzheimer’s disease and Parkinson’s disease (Parkinsonism related to HIV) has been reported in adults living with HIV (4, 47). The prevalence of Parkinsonism related to HIV is very low, ranging from 1% to 5% (47).

Disability Experienced with Cognitive Impairments

The challenges faced by adults living with HIV and cognitive disorders may include lower attention, motor speed, constructional abilities (impairment forming designs, objects, or materials with hands, under visual guidance), and verbal memory (41, 48-51).

The challenges specific to HAD include psychomotor slowing, apathy and motor disorders, similar to the bradykinesia and postural and gait abnormalities observed in late Parkinson’s disease (52).

We present three recommendations for cognitive rehabilitation and exercise interventions for older adults living with HIV with varying levels of neurocognitive impairments.

Hi) Cognitive Impairment – Mild to Moderate Cognitive Impairment

Hi.1 – Cognitive Rehabilitation

Recommendation 46: Cognitive interventions including cognitive training, cognitive stimulation, and cognitive rehabilitation should be recommended for older adults living with HIV with **mild cognitive impairment** because they are associated with significant improvements objective and subjective measures of memory, quality of life and mood / anxiety with benefits translated to improvements in daily functioning and mood. Specifically, **errorless learning** may be recommended for a potential positive effect on recall for older adults with HIV and cognitive impairment.

Level of Evidence: Moderate (systematic review but not Cochrane)

Age of Participants in Research Evidence: Younger and older adults with cognitive impairment



References

Jean L, Bergeron ME, Thivierge S & Simard M. Cognitive intervention programs for individuals with mild cognitive impairment: Systematic review of the literature. *American Journal of Geriatric Psychiatry*. 2010; 18(4): 281-296.

Hauer K, Becker C, Lindemann U & Beyer N. Effectiveness of physical training on motor performance and fall prevention in cognitively impaired older persons: A systematic review. *American Journal of Physical Medicine and Rehabilitation*. 2006; 85(10): 847-857.

Kessels RPC & Haan EHF. Implicit Learning in Memory Rehabilitation: A Meta- Analysis on Errorless Learning and Vanishing Cues Methods', *Journal of Clinical and Experimental Neuropsychology*. 2003; 25(6), 805-814. DOI: 10.1076/jcen.25.6.805.16474.

Hii) Cognitive Impairment

Hii.1 – Exercise

Recommendation 47: A combination of aerobic and resistive (strengthening) exercise should be recommended for older adults living with HIV with cognitive impairment for improvements in fitness, physical function, cognitive function, and positive behaviour. Evidence suggests older adults with cognitive impairment may benefit from exercise as much as older adults with no cognitive impairment. Due to diversity in exercise programs, measures of cognition, and study populations in the evidence, the optional type of exercise program (content, intensity, frequency, and duration) is unclear.

Recommendation 47a: Specifically, aerobic exercise may be associated with improvements in neurocognitive function among older adults with HIV with cognitive impairment for attention and processing speed, executive function, and memory.

Level of Evidence: Moderate (systematic review and meta-analysis but not Cochrane)

Age of Participants in Research Evidence: Majority of studies included older adults >60 years

References

Smith PJ, Blumenthal JA, Hoffman BM, Cooper H, Strauman TA, Welsh-Bohmer K, Browndyke JN & Sherwood A. Aerobic Exercise and Neurocognitive Performance: A Meta-Analytic Review of Randomized Controlled Trials. *Psychosomatic Medicine*. 2010; 72(3): 239–252. DOI: 10.1097/PSY.0b013e3181d14633.

Heyn PC, Johnson KE & Kramer AF. Endurance and strength training outcomes on cognitively impaired and cognitively intact older adults: a meta-analysis. *Journal of Nutrition, Health & Aging*. 2008; 12(6): 401-409.

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6 7 **Hiii) Cognitive Impairment – Dementia**

8 9 **Hiii.1 – Exercise**

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11 **Recommendation 48: Physical exercise** appears to be safe and may be recommended for
12 older adults living with HIV and dementia however insufficient evidence exists to suggest
13 benefits to cognition, function, behaviour, depression, and mortality.
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17 **Level of Evidence:** High (majority Cochrane systematic reviews)

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19 **Age of Participants in Research Evidence:** Older adults >65 years

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Category

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Chronic Obstructive Pulmonary Disease (COPD)

Chronic Obstructive Pulmonary Disease (COPD) occurs in more than 5% of the general population of adults over 45 years of age (53). COPD includes chronic bronchitis, emphysema and asthma. The prevalence of COPD among older adults living with HIV ranges from 10 - 16%, and is more prevalent among women (21%) compared with men (14%) living with HIV (3, 54).

With an increased prevalence of smoking among people living with HIV compared to the general population, adults with HIV are at increased risk of developing COPD (3, 18).

Disability Experienced by Adults with COPD

Challenges faced by adults living with HIV and COPD may include small airways abnormalities and nonspecific airway hyper-responsiveness. Challenges may also include shortness of breath, decreased activity tolerance, and a productive cough (3, 54).

We present three recommendations for pulmonary rehabilitation, exercise, and inspiratory muscle training (IMT) interventions for older adults living with HIV and COPD.

I.1 – Pulmonary Rehabilitation

Recommendation 49: Pulmonary rehabilitation (including upper and lower extremity exercise, inspiratory muscle training and breathing exercises) for at least four weeks is safe and strongly recommended for older adults living with HIV who have chronic obstructive pulmonary disease (COPD) to reduce mortality, improve dyspnea, health-related quality of life, functional exercise capacity and reduce future hospital admissions. Individuals with more severe COPD may require longer rehabilitation programs of at least 6 months to demonstrate benefits.

Level of Evidence: High (combination of Cochrane systematic reviews and meta-analysis but not Cochrane)

Age of Participants in Research Evidence: Majority of participants >60 years

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1.2 – Exercise

Recommendation 50: Aerobic and progressive resistance exercise at least two times per week for at least 8 weeks appears feasible, safe and may be recommended for older adults with HIV with **mild to moderate chronic obstructive pulmonary disease (COPD)** for improvements in exercise capacity and muscle strength that may translate into improved activity performance and societal participation. Careful consideration is required when prescribing progressive resistance exercise programs for people with COPD who have comorbid health conditions.

Level of Evidence: Moderate (systematic reviews and meta-analyses but not Cochrane)

Age of Participants in Research Evidence: Mean age >58 years

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O'Shea SD, Taylor NF & Paratz JD. Progressive resistance exercise improves muscle strength and may improve elements of performance of daily activities for people with COPD: A systematic review. *Chest*. 2009; 136(5): 1269-1283. Prepublished online September 4, 2009. DOI: 10.1378/chest.09-0029. Available from <http://chestjournal.chestpubs.org/content/136/5/1269.full.html>.

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1.3 – Inspiratory Muscle Training (IMT)

Recommendation 51: Inspiratory muscle training (IMT) is an important component of pulmonary rehabilitation and is strongly recommended for older adults living with HIV with chronic obstructive pulmonary disease (COPD) to improve inspiratory muscle strength and endurance, dyspnea, exercise capacity and quality of life. Optimal frequency, intensity, supervision and duration of IMT is unclear.

Level of Evidence: High (used Cochrane methodology)

Age of Participants in Research Evidence: Mean age 63 years

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Category

J

Diabetes

The prevalence of diabetes mellitus (DM) among adults living with HIV ranges from 3-15% (3, 55, 56). Diabetes mellitus is 2 times more prevalent among men compared to women living with HIV (3). With the presence of Hepatitis C, the prevalence of diabetes mellitus can increase up to 6% from 3% (55, 56).

Risk factors for developing diabetes include advancing age, being male, long period of HIV infection, and specific ethnicity (African Descent, Hispanic/Latino and Aboriginal) (5).

Adults living with HIV on combination antiretroviral therapy are at increased risk of developing diabetes, thus individuals should be screened for diabetes at onset of therapy initiation and about two to six months after (5).

Disability Experienced by Adults with Diabetes

Challenges faced among adults living with HIV and diabetes are lower body mass index preceded by impaired insulin tolerance and resistance, and high rates of Hepatitis C-virus infections (56, 57).

We present one recommendation for exercise for older adults living with HIV and diabetes.

J.1 – Exercise

Recommendation 52: Aerobic resistive exercise for at least 8 weeks is strongly recommended for older adults living with HIV with diabetes (type 2) to improve cardiopulmonary fitness and ensure glucose control. Optimal frequency, intensity, time and type of exercise are unclear however evidence suggests increased exercise prescription, fitness testing, supervision and group sessions at a greater number of times per week may be associated with greater health benefits. See the specific guidelines for more details.

Explanatory Notes: Exercise may also be considered as a preventative approach to prevent type 2 diabetes among older adults with HIV. Exercise may be particularly important in building up strength among PLHIV who may have had muscle wasting and poor nutrition related to diabetes

Level of Evidence: High (combination of Cochrane systematic reviews and meta-analyses not Cochrane)

Age of Participants in Research Evidence: Three of four studies - participant mean age 55 years (type 2 diabetes)

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For peer review only



Figure 1: Overall Classification of Evidence-Informed Recommendations

Stream A Recommendations
HIV Aging and Rehabilitation
 Derived from 42 low or very low level evidence articles

Stream B Recommendations
Rehabilitation Interventions in Comorbidities
 Derived from 108 high level evidence articles (meta-analyses or systematic reviews)

Recommendation Theme	#
Preparedness of Rehabilitation Professionals	1
Approaches to Rehabilitation Assessment and Treatment (physical, mental, neurocognitive, uncertainty, social inclusion)	7
Extrinsic Factors to consider with rehabilitation of older adults with HIV (ageism, stigma, disclosure, social support)	3
Intrinsic Factors to consider with rehabilitation of older adults with HIV (self-management, spirituality)	2
Rehabilitation Approaches (interprofessional practice, CAM)	2
Rehabilitation Interventions (exercise)	1
Total # Recommendations	16

Recommendation Classification	#
Bone and Joint Disorders Exercise, rehabilitation, self-management	4
Cancer Exercise	4
Stroke Rehabilitation, cognitive rehabilitation, electrotherapeutic modalities	7
Cardiovascular Disease Cardiac rehabilitation, exercise	6
Mental Health Exercise, psychotherapy, models of care and housing models	4
Cognitive Impairment Exercise, cognitive rehabilitation	3
COPD Pulmonary rehabilitation, inspiratory muscle training, exercise	3
Diabetes Exercise	1
Older Adults Exercise	3
HIV Exercise	1
Total # Recommendations	36

52 Detailed (Specific) Evidence-Informed Recommendations

Endorsement Rates for Each Recommendation Ranged from 53% - 100%

Overarching Recommendations on Rehabilitation for Older Adults with HIV (n=8)

1) Rehabilitation Professionals (RPs) should be prepared to provide care to older adults with HIV who present with complex comorbidities...

2) RPs should adopt an individualized approach to practice, sensitive to unique values, preferences and needs of older adults with HIV....

3) Multidisciplinary rehabilitation is strongly recommended across continuum of care...

4) RPs should consider the role of extrinsic contextual factors (stigma, ageism, HIV disclosure, social supports)....

5) RPs should consider the role of intrinsic contextual factors (self-management, spirituality)

6) Aerobic and resistive exercise may be recommended for older adults with HIV who are medically stable and living with comorbidities....

7) Cognitive rehabilitation interventions may be recommended for older adults with HIV with mild cognitive impairments and stroke...

8) In absence of high level evidence RPs should refer to high level evidence for recommendations on interventions for a specific comorbidity....

Evidence-Informed Recommendations in Rehabilitation for Older Adults Living with HIV

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18 recommendations.
19

Data Supplement File 3 - Characteristics of Included Studies in the Final Evidence-Informed Recommendations

Stream A: HIV, Aging and Rehabilitation (n= 42 studies)

Characteristic	Number (%)
Total number of included studies from which Stream A recommendations were derived	42
Sample size of participants across all included studies ~ ~based on 31/42 studies reporting sample size	4585 participants
Mean age of study participants (years) (range) + +based on data from 23/42 studies	50 years (42-68 years)
Gender of participants in included studies * Men Women Transgendered *based on 27/42 studies reporting gender	2497 (71%) 1022 (29%) 10 (<1%)
Country of origin of included studies United States Brazil Australia Not Reported	38 (90%) 1 (2%) 1 (2%) 2 (5%)
Year of Publication (Range)	1991-2010
Methods of included studies Qualitative studies Quantitative studies Narrative reviews / commentary / editorial	9 (21%) 21 (50%) 12 (29%)
Study Designs (as classified on data extraction forms) Review / narrative review Cross-sectional studies Survey Intervention study (non-RCT) Qualitative – Focus Group Qualitative (other) – either cross-sectional or longitudinal	13 (31%) 13 (31%) 8 (19%) 2 (5%) 1 (2%) 5 (12%)

Final Theme Classification of Included Studies

Overarching principles for rehabilitation of older adults with HIV	2 (5%)
Mental health (depression; neurocognition)	10 (24%)
Determinants of Health	2 (5%)
Uncertainty	1 (2%)
Physical health (aerobic capacity)	2 (5%)
Social inclusion	1 (2%)
Spirituality	4 (10%)
Strategies to address health challenges for older adults with HIV (lifestyle, coping, etc)	3 (7%)
Extrinsic factors that influence HIV and aging (social support, stigma, etc)	10 (24%)
Personal attributes further increasing the complexity of HIV and Aging	3 (7%)
Interventions (exercise; neurocognitive interventions)	4 (10%)

Stream B: Rehabilitation Interventions in Comorbidities (n=108 studies)

Characteristic	Number (%)
Total number of included studies from which Stream B recommendations were derived	108
Total number of individual studies / trials included in the systematic reviews and meta-analyses	2484
Sample size / total number of participants across all included studies in the systematic reviews and meta-analyses* *as reported in 102/108 studies	179,777 participants
Year of publication (range)	1992-2011
Type of comorbidity in included studies	
Bone and joint disorders	11 (10%)
Cancer	12 (11%)
Stroke	31 (29%)
Cardiovascular disease	16 (15%)
Mental Health	4 (4%)
Cognitive Impairment	10 (9%)
Chronic Obstructive Pulmonary Disease (COPD)	7 (6%)
Diabetes	4 (4%)
Older Adults	11 (10%)
HIV	2 (2%)
Study Design of Included Studies	
Cochrane systematic review*	36 (33%)
Meta-analysis	21 (19%)
Systematic review or Clinical Practice Guideline (CPG)*	24 (22%)
Systematic review and meta-analysis	27 (25%)
*Published by the Cochrane Collaboration/Wiley and/or follows Cochrane Collaboration protocol	

Intervention Focus of Included Studies

Biofeedback	1	(1%)
Education	1	(1%)
Electrical Stimulation	2	(2%)
Exercise	63	(58%)
Fall Prevention	1	(1%)
Housing Models	1	(1%)
Inspiratory Muscle Training	1	(1%)
Mobilization	1	(1%)
Models of Care	1	(1%)
Occupational Therapy	4	(4%)
Prevention Programs	1	(1%)
Psychotherapy	1	(1%)
Rehabilitation	27	(25%)
Self-Management Programs	1	(1%)
Strength Training	1	(1%)
Visual Feedback Therapy	1	(1%)

The COGS Checklist for Reporting Clinical Practice Guidelines

Shiffman RN, Shekelle P, Overhage M, Slutsky J, Grimshaw J, Deshpande SM. Standardized Reporting of Clinical Practice Guidelines: A Proposal from the Conference on Guideline Standardization *Ann Intern Med.* 2003;139:493-498.

Topic	Description	Reported on Page #
1. Overview material	Provide a structured abstract that includes the guideline's release date, status (original, revised, updated), and print and electronic sources.	Page 3
2. Focus	Describe the primary disease/condition and intervention/service/technology that the guideline addresses. Indicate any alternative preventive, diagnostic or therapeutic interventions that were considered during development.	Page 6-7
3. Goal	Describe the goal that following the guideline is expected to achieve, including the rationale for development of a guideline on this topic.	Page 6-7
4. Users / setting	Describe the intended users of the guideline (e.g., provider types, patients) and the settings in which the guideline is intended to be used.	Page 20-21
5. Target population	Describe the patient population eligible for guideline recommendations and list any exclusion criteria.	Page 7-9
6. Developer	Identify the organization(s) responsible for guideline development and the names/credentials/potential conflicts of interest of individuals involved in the guideline's development.	Page 8; 25-26 (and title page)
7. Funding source / sponsor	Identify the funding source/sponsor and describe its role in developing and/or reporting the guideline. Disclose potential conflict of interest.	Page 26-27
8. Evidence collection	Describe the methods used to search the scientific literature, including the range of dates and databases searched, and criteria applied to filter the retrieved evidence.	Page 8-10
9. Recommendation grading criteria	Describe the criteria used to rate the quality of evidence that supports the recommendations and the system for describing the strength of the recommendations. Recommendation strength communicates the importance of adherence to a recommendation and is based on both the quality of the evidence and the magnitude of anticipated benefits or harms.	Page 10-13
10. Method for synthesizing evidence	Describe how evidence was used to create recommendations, e.g., evidence tables, meta-analysis, decision analysis.	Page 10-14
11. Pre-release review	Describe how the guideline developer reviewed and/or tested the guidelines prior to release.	Page 15-16

12. Update plan	State whether or not there is a plan to update the guideline and, if applicable, an expiration date for this version of the guideline	Page 25 (statement of ongoing revision required)
13. Definitions	Define unfamiliar terms and those critical to correct application of the guideline that might be subject to misinterpretation.	Page 6, 8 (disability and rehabilitation)
14. Recommendations and rationale	State the recommended action precisely and the specific circumstances under which to perform it. Justify each recommendation by describing the linkage between the recommendation and its supporting evidence. Indicate the quality of evidence and the recommendation strength, based on the criteria described in 9.	Data Supplement File 2
15. Potential benefits and harms	Describe anticipated benefits and potential risks associated with implementation of guideline recommendations.	Page 20-21
16. Patient Preferences	Describe the role of patient preferences when a recommendation involves a substantial element of personal choice or values.	Page 20-22
17. Algorithm	Provide (when appropriate) a graphical description of the stages and decisions in clinical care described by the guideline.	Figures 1-3
18. Implementation considerations	Describe anticipated barriers to application of the recommendations. Provide reference to any auxiliary documents for providers or patients that are intended to facilitate implementation. Suggest review criteria for measuring changes in care when the guideline is implemented.	Page 20-25 (Discussion)