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**Title: Interventional programmes for community reintegration following spinal cord injury: a scoping review**

**Running Title: Community reintegration following spinal injury**

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SKS contributed to the design of the study, conducted literature search, data charting, and drafted the manuscript. BK contributed in the study design, performed article screening, and provided critical feedback on the manuscript. BB performed article screening, provided critical feedback, and contributed in drafting the manuscript. AHM, FF, DS, UMB, and MC provided critical feedback and contributed substantially in drafting the manuscript.

## **Abstract**

Advances in healthcare and technology have led to increased survival rates following spinal cord injury (SCI). To facilitate recovery, regain function, and promote quality of life after SCI, rehabilitation in the acute care setting is of paramount importance. Following discharge from acute care, there is difficulty in accessing appropriate intervention to facilitate community reintegration. This review examined the content, strengths, limitations, and effectiveness of existing community reintegration intervention programmes following SCI to promote the adoption of the existing programmes or the development of new interventions for individuals with SCI in a low-resource setting. We conducted a review of the literature using Arksey and O'Malley's methodological framework. Six electronic databases were searched from the database inception to September 2022, including Medline, CINAHL, Web of Science, PsycINFO, Sabinet, and Global Health. A manual search of the selected references was also conducted. Seven articles met our inclusion criteria. Overall, 290 individuals participated in the included studies, 80% of the participants were males, and the majority of the participants had an injury at the thoracic level. The studies presented different interventional programmes with varying contents addressing different aspects of community reintegration such as household duties, mobility, health maintenance, and recreation. All the identified programmes have evidence of preliminary effectiveness in some domains of community reintegration (e.g. household duties, mobility, and health). However, most available programmes are geared toward addressing a specific aspect of community reintegration and may not be suitable for individuals with complex needs. A robust programme that encompasses all critical aspects of community reintegration (housing and household duties, mobility, recreation, health maintenance, pain management, sexuality, social support, and employment) may be required. Hence, further development and validation of existing programmes are warranted.

***Keywords:*** Social Participation; Wellbeing; Self-efficacy; Return to work; Spinal cord injury

## **I. Introduction**

The incidence of spinal cord injury (SCI) in low and middle-income countries ranges from 2.1 to 130.7/million/year, with males accounting for about 83% of the affected individuals <sup>1</sup>. For instance, in Nigeria, the prevalence of SCI ranges from 13.6% to 31.8% <sup>2,3</sup>. Males of ages between 18 to 45 years are commonly affected <sup>4-6</sup>. Thoracic spine is the frequent site of the injury and the majority of the SCI survivors present with paraplegia <sup>2,6</sup>. Trauma (such as road traffic accident, motor vehicular collision, gunshot, fall from height, occupational injuries, etc.) is the most common cause of SCI in Nigeria <sup>2-4,6</sup>. An SCI is a life-changing experience that poses enormous medical, social, and financial challenges to the survivors, their families, and society at large <sup>7</sup>. Following an SCI, a person may experience a variety of sequelae, ranging from physical impairments such as the inability to walk to participation restrictions, such as the inability to return to work or perform social obligations at a family or community level <sup>8-10</sup>.

Advances in healthcare and technology have led to high survival rates after SCI. Significant progress has been made in promoting long-term health, community participation, and quality of life of individuals with SCI, especially in high-income countries <sup>11</sup>. Successful acute care, including early rehabilitation after SCI, has been responsible for increased survival and promotion of long-term health and quality of life for SCI survivors <sup>11</sup>. Despite these advances, life expectancy after SCI in low- and middle-income countries remains remarkably low, with life expectancy for people with tetraplegia being around two years post-injury or less <sup>11,12</sup>. The literature shows that more than 90% of people in higher-income countries survive SCI; a figure that is three-fold higher than the rates reported in low and middle-income countries <sup>11</sup>. Hence, the need for robust and appropriate care in low- and middle-income countries, including community reintegration. Survivors of SCI are heterogeneous, so their rehabilitation needs can vary widely. A multifaceted

approach using a team of multidisciplinary professionals is needed to provide a comprehensive intervention for community reintegration.

Community reintegration broadly comprises the ability to participate in community life, including access to adequate housing, the ability to navigate the community, participation in work, education, and recreational activities of choice, and engagement in satisfying social relationships and social roles <sup>13</sup>. Community reintegration is the ultimate goal of rehabilitation for people with SCI <sup>14</sup>. Rehabilitation interventions to facilitate community reintegration are critical in promoting social participation and overall well-being for people with chronic conditions such as SCI <sup>10</sup>. Following acute care, an intensive rehabilitation programme is required to facilitate social reintegration and community participation for people with SCIs. Rehabilitation programme for reintegration may include aspects such as patient education and physical, vocational, and psychosocial rehabilitation; which can be provided through institutional or community-based approaches and, in some cases, telerehabilitation <sup>15,16</sup>. Several factors have been documented to influence community reintegration in SCI survivors. For example, social support (from friends and family as well as peer mentors) and adequate financial resources have been found to promote social reintegration, while the physical environment, unfavourable social attitudes, and psychological problems have been identified as barriers to successful community reintegration <sup>17</sup>.

The process of community reintegration encompasses participation in society, including independent living, employment, recreation, social activities, and relationships with others <sup>16,18</sup>. Existing literature focuses on factors that influence community reintegration, with an emphasis on barriers and facilitators to community reintegration <sup>17,19–24</sup>. Further, studies tend to focus on evaluation of community reintegration programmes following acute care and hospital-based rehabilitation <sup>25–28</sup>. A recent review examined the range, extent, and nature of published studies on

community reintegration programmes and interventions that support people affected by SCI in the transition from hospital to home<sup>13</sup>. The majority of the intervention programmes focused on the transition to home, as well as other aspects of rehabilitation, such as patient education<sup>13</sup>. There is little systematic literature that specifically summarises community reintegration approaches by examining the content, strengths, limitations, and effectiveness (usefulness) of such interventions. This information is critical for the development and implementation of context-specific programmes to promote community reintegration, particularly in low- and middle-income settings where SCI survivors are more disadvantaged. Therefore, this review aims to examine the content, strengths, limitations, and effectiveness (usefulness) of existing community reintegration intervention programmes following SCI, especially in low-resource settings.

## **II. Methods**

### ***A. Design***

We used the methodological framework of Arksey and O'Malley and the PRISMA extension for scoping reviews (PRISMA-Scr)<sup>29,30</sup>. The review was conducted in five steps: (i) identification of the research question; (ii) development of the search strategy; (iii) identification and selection of relevant studies; (iv) data collection; and (v) collation, synthesis, and reporting of findings<sup>30</sup>.

### ***B. Step 1: The research question***

The study aims to characterise existing community reintegration interventions following SCI. Our guiding research question was: what are the contents, strengths, limitations, and reported effectiveness/usefulness of existing intervention programmes for community reintegration after SCI? Community reintegration is an amorphous concept and is defined here as a process that involves returning to family and community life, taking on social roles and responsibilities, and

actively contributing to social groups and society as a whole <sup>18</sup>. Thus, community reintegration is construed using three interrelated concepts: independent living, social participation, and participation in paid work <sup>18</sup>.

### ***C. Step 2: The search strategy***

Six electronic databases, Medline, Cinahl, Web of Science, PsycInfo, Sabinet, and Global Health, were searched from database inception to 30<sup>th</sup> September 2022. Using the acronym "PICOS", the search strategy was developed as follows. Population: SCI survivors; Interventions: Rehabilitation interventions focused on promoting community reintegration after discharge from acute care; Comparison: with or without an intervention; Outcome: Community reintegration, social participation, and self-efficacy; Study type: Qualitative, quantitative, or mixed methods. Search terms were adapted to the selected databases. Relevant medical terms and keywords were used to capture multiple domains of community reintegration (Appendix 1). In addition, a manual search of the references of the selected literature was conducted to identify further relevant studies.

### ***D. Step 3: Study selection***

Studies were included if they, i) were published in English language and reported on community reintegration intervention, using either a quantitative, qualitative, or mixed-methods design; ii) included community reintegration, social participation, or self-efficacy as an outcome. Studies that were not peer-reviewed, editorials, opinions, reviews, or conference proceedings were excluded.

All studies identified in the literature search were imported into Covidence (<https://www.covidence.org>). Two authors (BK and BB) independently reviewed the titles and abstracts of potential studies for full-text screening. Any disagreements between the authors were



resolved through discussion. If disagreements persisted, a third author (SKS) was consulted for mediation. The full-text screening procedure was identical.

SKS and BK assessed the methodological quality of the included studies using the Effective Public Health Practise Project's quality assessment instrument for quantitative studies <sup>31</sup>. The instrument includes eight components (study design, data collection process, withdrawals and dropout, selection bias, intervention integrity, blinding, confounders, and analyses) and a global quality assessment. The global rating classifies the study as strong, moderate, or weak, depending on how well the study performs in the eight individual components <sup>32</sup>.

#### ***E. Step 4: Data extraction***

The Cochrane Collaboration's data collection form for intervention reviews, involving randomized controlled trials (RCTs) and non-RCTs was used to guide the development of the data extraction form <sup>33</sup>. The focus was on the information needed to answer our research question. Data extracted included: author, year of publication, title, country, rationale, study aim, study design, sample size, intervention programme, programme aims, programme composition, setting, duration, frequency, authors' recommendation(s), and study limitations. SKS and BK independently extracted the relevant data from the included studies. The results were compared for consistency. In case of discrepancies, the two authors reached a consensus through discussion or consultation with a third reviewer (BB).

#### ***F. Step 5: Collating, summarizing, and reporting findings***

Descriptive and narrative syntheses were used to summarise the nature and extent of the available evidence on the contents and effectiveness/usefulness of the intervention programmes for community reintegration following SCI. The process involved an examination of the textual and

numeric data reporting the intervention programmes, which takes into account the key effect sizes reported and the quality of the studies assessed. To identify the strengths and limitations of the interventions, a standardized conceptual framework is required. To our knowledge, such a framework is lacking. However, the Swiss Paraplegic Research has identified seven critical issues to address in an intervention for community reintegration following SCI. The issues include housing and household duties (accessible housing, house chores, outdoor maintenance, etc.), mobility (wheelchair mobility, accessible transportation, etc.), recreation (cultural, sports, etc.), health maintenance (physical fitness and available resources in the community), pain management (strategies for pain management), sexuality (resources and services for addressing sexuality issues such as psychological counselling), social support (family, friend, and peer support), and paid/gainful employment (activities that optimize work participation such as vocational rehabilitation)<sup>34</sup>. We analyzed and mapped the contents of the programmes to the critical issues/components of the community reintegration following SCI, to compare and contrast the strengths and limitations of the programmes.

### **III. Results**

#### ***A. Database search***

The search identified 756 studies from the databases (Medline=221; Cinahl=257; Web of the Science = 210; PsycInfo=32; Sabinet=3; Global Health=33) and six studies from the manual search processes. Overall, a total of 762 studies were identified. After removing duplicates, 624 titles and abstracts were screened. Of 93 full-text articles screened, seven were considered for data extraction (Figure 1).

#### ***B. Characteristics of the studies***

All the eligible studies were from high-income countries. The studies were conducted in Canada<sup>25</sup>, Korea<sup>26,27</sup>, Netherlands<sup>35</sup>, and the United States<sup>36–38</sup>. The studies included three RCTs<sup>35,36,38</sup>, two mixed methods<sup>25,26</sup>, one quasi-experiment<sup>37</sup>, and one case series<sup>27</sup>. The studies recruited 290 participants (83.8% males), with sample sizes ranging from four to 106. Five studies were conducted in a rehabilitation centre<sup>25,26,35–37</sup>, while two were community-based programmes<sup>27,38</sup>. The intervention lasted between four weeks and one year, with a variable follow-up period. Based on Effective Public Health Practise Project's quality assessment, three of the included studies were of weak quality<sup>26,27,37</sup>, three were of moderate quality<sup>25,35,38</sup>, and one was of strong quality<sup>36</sup>. Table 1 provides further information on the characteristics of the included studies.

### ***C. Intervention programmes for community integration***

Seven intervention programmes to promote community reintegration were identified in the included studies (Table 2). We could not find any intervention from a low-resource setting since none of the included studies was reported from low and middle-income countries. All the identified intervention programmes had aspects of physiotherapy except for one, Reinventing Yourself.

### ***D. Composition of the intervention programmes***

#### ***1. Transitional Rehabilitation Programme***<sup>26</sup>

Transitional Rehabilitation Programme aims to promote activities of daily living and social participation, by shortening the stay in the hospital-based rehabilitation programme, so that the individual can get to the community faster<sup>26</sup>. The programme was developed through in-depth interviews, patient assessment, and a goal-setting conference. The programme includes self-care, home care, and social participation. Self-care includes personal management, transfers, wheelchair skills, risk management, nutrition, orthotic testing, psychological support, physical fitness,

nutritional counselling, and SCI education. Home care includes housework, psychological support for the carer, introduction to community resources, economic advice, sex and relationships, and advice and support with home modification. Social participation, on the other hand, includes going out, leisure and hobbies, para-sports, driving, returning to school, and returning to work <sup>26</sup>. The intervention is comprehensive and can be adapted according to the needs of the user. A pilot investigation showed that the programme was effective in promoting community integration. Hence, the intervention requires further evaluation to establish its effectiveness/usefulness <sup>26</sup>. Table 2 provides more details about the programme.

## *2. Reinventing Yourself* <sup>36</sup>

Reinventing Yourself is an education-based group therapeutic intervention programme aimed at strengthening personal self-efficacy <sup>36</sup>. The programme comprises six sessions over six weeks, with each session lasting two hours. The sessions included didactic presentations of key principles/skills and experiential exercises such as goal setting and problem-solving with in-depth group discussions. Throughout the intervention, eight specific skills are considered that aim to change a person's perspective on events, build confidence by focusing on personal strengths, develop ways to recognise and appreciate the good in one's life, and express gratitude for positive qualities. The skills include the happiness formula (factors that contribute to happiness), the ladder of reinvention (progressive steps to follow), smart goals, how thoughts drive emotions, the ABCDE approach (Adversity, Beliefs, Consequences, Disputing and Energising), breaking down thinking, using personal strengths, and gratitude <sup>36</sup>.

In the first session, an overview of the group sessions is given and the happiness formula alongside the ladder of reinvention are introduced. The second session introduces the smart goals, with participants setting their goals individually and discussing them with the group. In the third

session, individual goals are reviewed and a presentation is made on how thoughts drive emotions and the ABCDE approach. The fourth session includes a review of the ABCDE approach with a focus on D (Disputing), a discussion on individual obstacles that might hinder the achievement of goals, and a presentation on dispelling thinking. The fifth session involves identifying personal strengths, presenting personal strengths, and practising problem-solving using the identified strengths. The sixth session concludes with a presentation on the principle of gratitude and a review of personal goals using the eight principles, as well as a discussion on how to sustain success <sup>36</sup>. The intervention was found to be effective/useful in promoting self-efficacy for a short period (six weeks), however, further evaluation is required <sup>36</sup>. Table 2 provides more details about the programme.

### *3. Behavioural Intervention* <sup>35</sup>

Behavioural Intervention aimed to promote physical activity in daily life after discharge from inpatient rehabilitation. The intervention includes 13 one-to-one personal sessions with a coach (physiotherapist/occupational therapist) trained in motivational interviewing; each session starts with the participant proposing the topic for the interview <sup>35,39</sup>.

The intervention consisted of four main components. The first component is feedback on daily wheelchair activity using bicycle odometers. The bicycle odometer is attached to the wheelchair and records the distance travelled per day. The participant was guided to track the distance travelled and set goals to increase the distance travelled. The second component is the development of action plans on how and when to be physically active and coping strategies to deal with obstacles that might prevent the actual implementation of an action plan. The third component was a home visit by the coach in the first month after discharge. During this visit, the coach helps to optimise and change the participant's home and environment for an active lifestyle. The fourth

component is the provision of additional information at the participant's request on relevant topics related to physical activity, such as possible health benefits <sup>35,39</sup>. The intervention has been found to be effective/useful in eliciting a behavioural change toward a more active lifestyle and improved social participation among people with subacute SCI <sup>35</sup>. Table 2 provides more details about the programme.

#### *4. Manual Wheelchair Skill Training* <sup>38</sup>

The Manual Wheelchair Skill Training focused on developing wheelchair skills to promote community participation. The program consisted of 32 wheelchair skills, which are divided into three skill levels, indoor, community, and advanced. The skills were derived from a set of competencies considered relevant by wheelchair users and healthcare professionals. The participants are trained in their homes or elsewhere, for instance on a family member's staircase. The participants are exposed to five one-to-one training sessions for 30 - 45 minutes, three times a week for five weeks <sup>38</sup>. The intervention was found to improve wheelchair skills capacity; however, it has small impact on participation <sup>38</sup>. Table 2 provides more details about the programme components.

#### *5. Community Reintegration Outpatient Programme* <sup>25</sup>

Community Reintegration Outpatient Programme is an interprofessional, cohesive therapeutic education service designed to promote wellness and community participation following SCI <sup>25</sup>. The programme begins with goal setting; each participant sets a goal to achieve within the 12-week programme period. To facilitate weekly discussion and support goal achievement, participants are provided with a teaching manual that was developed based on data from existing literature. The manual consists of twelve topics that are discussed weekly at a rate of one topic per

week. Topics include Self-care and You (identifying individual and social roles in self-care); Adjustment and Transition (role transition, grief styles, doing, being, and belonging); Coping with Stress (nature of stress, signs, and triggers); Problem Solving (role of cognitive executive function in the coping process); Emotions (affect, feeling and emotions); Self-talk (relationship between cognition, emotion, and behaviour); Communication (communication styles); Energy Management (principles of energy conservation); Pain Management (understanding the connection between pain, body, and mind); Community Outing (application of learning); Hope and Happiness (social, emotional, and physical well-being, looking forward); and Resources/Visual Roadmap (individual presentations and next steps). There is a weekly homework assignment for each session and various visual and learning aids are used to facilitate learning<sup>25</sup>. The intervention was found to improve self efficacy and positive affect for a short time (three months) in persons with SCI, however, there is a need to identify strategies to maintain long-term gains<sup>25</sup>. Table 2 provides more details about the programme.

#### *6. Community-based Ambulation Training<sup>27</sup>*

The core of Community-based Ambulation Training programme is to strengthen walking skills and provide better opportunities for returning to community life after an SCI. The training programme consisted of four phases with different situations in the community. Each phase lasts for a duration of six hours a week (one hour per session for six days) and progression to subsequent phase is made when the client achieves the goals of the preceding phase. In the first phase, the training is conducted on a 150m route that includes the corridor of a hospital, flat terrain near the hospital, and low stairs. The first phase aims to promote subsequent adaptation to gait training in a real community situation. In the second phase, the training aims to improve the ability to navigate a community setting that requires attention during walking. The walking route for the training is

200m long and consists of uneven terrain outside the hospital and pavement in a public area where many people are walking. In the third phase, the training is conducted on a 300m route that includes curbs, a low ramp, a zebra crossing, and a pavement with some obstacles such as narrow spaces, street trees, and architectural barriers. The third phase aims to enable a person to overcome difficult environmental conditions to move successfully in the community. In the fourth and final phase, training is conducted on a 500m route that includes pavement and a zebra crossing in a busy environment and a car park in a shopping centre near the hospital. In the shopping centre, patients are instructed to climb up and down stairs and push a shopping trolley. The fourth phase aims to enable the participants to move around in the community and to increase their confidence in community mobility. During the training, the level of difficulty is increased weekly by gradually changing the demands of the environment. In each phase, participants completed one hour of walking training, six times a week for four weeks <sup>27</sup>. The intervention was found to improve walking function of ambulatory patients with incomplete SCI and offers better opportunities for reintegration into community life <sup>27</sup>. Table 2 provides more details about the programme.

### *7. Peer Mentoring* <sup>37</sup>

Peer Mentoring programme aims to serve as a source of information and support for newly injured persons with SCI at home or in a rehabilitation centre, based on tutoring by older and experienced persons with SCI <sup>37</sup>. The programme consists of mentees, mentors, and supervisors (hospital staff). The mentees are the new spinal cord injury patients who are matched with mentors based on clinical and demographic profiles (race and type of injury). Mentors discuss with mentees a range of relevant topics such as medical care, housing, education, driving, transportation, recreation, employment, relationships, sexuality, finances, emotional distress, public accessibility, utilities, immigration, relationship with mentors, and other relevant topics. Mentors provide social,



emotional, instrumental, and informational support, and make referrals to other agencies as needed. The supervisors are hospital staff who train the mentors before the programme begins and monitor the programme to provide feedback on the project and its effectiveness. At the beginning of the intervention, the mentees developed their own goals with mentors that fit with their specific needs or interests <sup>37</sup>. In this sample of persons with violently acquired SCI, the programme improved community participation among the individuals <sup>37</sup>. Table 2 provides more details about the programme.

***E. Comparison among the programmes based on the critical components of community reintegration and perceived strengths and limitations of the interventions***

We linked the contents of the interventions to the following central aspects of community reintegration for persons with SCI, housing and household duties, mobility, recreation, health maintenance, pain management, sexuality, social support, and employment <sup>34</sup>. Of the seven programmes analysed, only two interventions, Transitional Rehabilitation Programme and Peer Mentoring featured all the critical domains except pain management. However, Peer Mentoring is purely a motivational educational programme unlike the Transitional Rehabilitation Programme, which involves both education and performance-based activities. On the other hand, the Behavioural Intervention programme features housing and household duties, mobility, recreation, and health maintenance. Behavioural Intervention programme is similar to Peer Mentoring and is solely a motivational educational intervention. The Community Reintegration Outpatient Programme included only two critical domains, health maintenance, and pain management, even though the programme involves active participation in an educational activity. The remaining three programmes featured only one aspect of the critical domains of community reintegration, Reinventing Yourself (health maintenance), Manual Wheelchair Skill Training (mobility), and

Community-based Ambulation Training (mobility). Table 3 provides details of the comparison among the programmes based on the critical domains of community reintegration and identified strengths and limitations of the programmes. Out of all the programmes reviewed, only the Transitional Rehabilitation Programme and Peer Mentoring are feasible to implement in low-resource settings.

#### ***F. Evidence of effectiveness/usefulness of the intervention programmes***

Available information from the included studies shows that all the programmes are effective/useful in critical domains of community integrations measured with tools like the Craig Handicap and Reporting Technique (CHART), Community Integration Questionnaire (CIQ), Impact on Participation and Autonomy (IPA), Moorong Self-Efficacy Scale (MSES), Participation Assessment with Recombined Tools–Objective (PART-O), and ICF Measure of Participation and Activities-Screener (IMPACT-S). Evidence extracted from the included studies is presented in the following paragraphs.

The Transitional Rehabilitation Programme was effective in promoting self-care, activities of daily living, physical function, community integration, and quality of life, measured with the Korean version of the Spinal Cord Independence Measure, Seoul-Instrumental Activities of Daily Living, Rehabilitation Institute of Chicago Functional Assessment Scale, Korean-CIQ, and Korean-WHOQOL-BREF respectively <sup>26</sup>. However, the quality of this evidence is weak. On the other hand, the Reinventing Yourself programme increased the self-efficacy (MSES) scores of the participants from baseline to six weeks post-intervention. However, the improvement was not retained at the 30-week follow-up <sup>36</sup>. In addition, the quality of this evidence is strong.

Similarly, the Behavioral Intervention was significantly effective on participation (IMPACT-S) one year after discharge, however, there was no effect on the quality of life (SF-36)<sup>35</sup>. The quality of this evidence is moderate. On the other hand, the Manual Wheelchair Skills Training was effective on the CHART-Mobility sub-scale and wheelchair skills test. Further, the participants retained these improvements at the one-year follow-up<sup>38</sup>. Moreover, the quality of this evidence is moderate.

The Community Reintegration Outpatient Programme was effective in promoting self-efficacy (MSES) and quality of life (WHOQOL-BREF). Moreover, there was a significant effect on community participation: perceived barriers to autonomy in the outdoors (IPA) decreased from baseline to exit. However, all improvements were not retained at six months follow-up, although the participants were generally satisfied with the program<sup>25</sup>. The quality of this evidence is moderate. Similarly, the Community-based Ambulation Training improved the walking function (measured with a 10-metre walk test, six-minute walk test, and community walk test) of the participants after the training, and the benefits were retained at both the four-week and one-year follow-ups<sup>27</sup>. The quality of this evidence is weak.

Lastly, Peer Mentoring was effective on the cognitive and occupation subscales of the CHART. Participants showed positive changes in their ability to manage their care and participate in school, work, and other positive roles in society. Further, follow-up interviews with the participants revealed that they were satisfied with the program<sup>37</sup>. The quality of this evidence is weak.

#### **IV. Discussion**

Various community reintegration programmes following acute SCI rehabilitation are available. However, this review did not find any intervention studies that had been implemented in a low-resource setting, such as Africa. The only identified studies were from high-income countries (the United States, the United Kingdom, the Netherlands, and Korea).

A strength of the programmes reviewed in these studies is their ability to holistically individualise each component of the programme to meet the specific needs of the person. This is not necessarily a prerequisite for running the programme in a group setting, but it does allow individuals to work at their own pace and in their environment. In addition, it should be noted that most programmes included educational and motivational components to encourage participation. Other benefits included the opportunity for experiential learning, peer support to describe their expectations of the therapy process, home visits by the trainer to improve participants' living conditions, exercises that promote community cohesion, and training that simulates real-life circumstances and sensitises learners to the realities of the environment. However, the programmes have some limitations, including the short time frame for skill development, the unvalidated programmes that do not focus on the family and social role, their acceptability in resource-poor areas, the limited intervention components that lack expert inputs, and the need for modifications to meet individual needs, such as only educational interventions without performance-based activities and lack of peer support. Majority of the programmes were not designed to holistically promote community reintegration, hence the lack of critical elements of community reintegration in those interventions. Only two programmes, the Transitional Rehabilitation Programme and Peer Mentoring appear to be more holistic and can be deployed in low-resource settings, based on their composition of the core components of community reintegration intervention following SCI.

Various factors are known to hinder successful reintegration following hospital-based rehabilitation of SCI survivors <sup>17,24</sup>. For instance, studies have shown that lack of accessible transportation limits the participation of people with SCI in many important areas of life, including reduced employment opportunities, limited social support, and reduced family functioning <sup>40</sup>. Combining time since injury, completeness of injury, secondary conditions, and functional independence, Carr et al., 2017 <sup>41</sup> found that employment was the strongest independent factor associated with community participation. Participation for individuals with SCI needs to be highly justified to outweigh the effort involved, and the more SCI victims engage with the community, the more they discover that they have other opportunities to participate. Carr et al., 2017 <sup>41</sup> concluded that rehabilitation programmes should provide opportunities for people with SCI to find meaningful employment and participate in meaningful activities. Even though the majority of the existing programmes did not incorporate the critical aspects into the rehabilitation such as employment, pain management, or sexuality, future designs or developments of community reintegration programmes for people with SCI should do so.

In low-resource countries, there are very few studies on interventional programmes for the reintegration of SCI survivors into the community <sup>42</sup>. To the best of our knowledge no community reintegration studies have been conducted in Africa. People with SCI in Africa rarely receive holistic care even though the risk of developing complications that can lead to participation restriction is high <sup>42</sup>. There are several reasons for this, including historical, socio-cultural, political, and economic <sup>43</sup>. In particular, it can be difficult to introduce such programmes into African society in the absence of wheelchair access, ramps, accessible buildings, and other environmental problems. Systemic, organisational, and individual barriers may also play a role <sup>44</sup>. In addition, other possible reasons, include insufficient funding for research, a lack of dedicated

research team/personal capacity, a lack of staff trained in research, and a lack of team engagement<sup>44,45</sup>. Moreover, inadequate access to reliable internet services, competing demands, and operational barriers may contribute to the problems<sup>44</sup>. Further, some developing countries struggle to provide overarching spinal care due to the high cost and technical complexity of spinal rehabilitation instruments<sup>43</sup>.

Community reintegration encompasses three interrelated domains, independent living, social participation, and participation in paid work<sup>18</sup>. Earlier research on promoting independent living via increasing physical activity was based on social cognitive theory. According to this theory, self-efficacy directly affects behaviour<sup>46</sup>. Self-efficacy also indirectly affects behaviour by influencing outcome expectations and self-regulatory strategies<sup>46</sup>. Individuals could be able to solve problems, communicate, and manage emotions themselves at home<sup>46</sup>. Social support has also been suggested to influence physical activity as it affects self-efficacy, particularly concerning participation in physical activity<sup>46</sup>. In the present review, Behavioural Intervention, Transitional Rehabilitation Programme, and Peer Mentoring aimed to strengthen the individuals' power to perform daily activities and effective social reintegration in the community. The programmes could empower the individuals to take care of themselves and their home, solve problems, communicate and control their emotions. In addition, the Community Reintegration Outpatient Programme and Peer Mentoring could provide SCI survivors with the skills needed to cope with stress and integrate their new way of life.

### ***A. Limitations***

The present study is not without some limitations. For instance, a grey literature (non peer reviewed) search was not conducted, hence, we may have missed some relevant information. We

utilised the search terms “community re-integration/social participation” in the literature search, but related constructs such as quality of life/wellbeing were not explored. Only studies published in the English language that are available online were included in this review. We could not synthesise the overall treatment effect of the programs on community reintegration as scoping reviews are only exploratory. A future review could employ a more elaborative search to include grey literature. Systematic review with meta-analysis should be considered to synthesise the overall effect of the programs on community reintegration. It is also important to note that only one included study was of high quality, while the other studies were of moderate to low quality (Table 2). Therefore, the findings of this scoping review should be interpreted with caution.

### ***B. Conclusions***

The review examined the contents, strengths, limitations, and effects/usefulness of community reintegration programmes available for individuals with SCI. We identified seven interventional programmes with varying contents that address different aspects of community reintegration. Each interventional programme has unique strengths and limitations. Most of the programmes aimed to address a specific aspect of community reintegration and may not be suitable for individuals with complex needs. Although the programmes have evidence of preliminary effectiveness in various domains of community reintegration, a robust programme that encompasses all the domains of community reintegration is required. Thus, further development and validation of existing programmes are warranted. However, two programmes, Transitional Rehabilitation Program and Peer Mentoring have shown a greater promise in promoting community reintegration and social participation of individuals with SCI. Hence, any of the two interventions could be considered for future use.

### ***C. Highlights***

Community reintegration is a multidimensional process, involving the resumption or adoption of social roles that are culturally appropriate, and full participation in the physical and sociocultural environment. Successful community reintegration is the ultimate goal of rehabilitation following SCI. Numerous interventional programmes that focus mostly on self-management education are used to promote a return to home and social participation after SCI. Most of the available interventions were not specifically designed to comprehensively address community reintegration following SCI. None of the identified programmes was developed for use in low-resource settings. Transitional Rehabilitation Programme and Peer Mentoring were the only interventions that comprised critical aspects of community reintegration. Preliminary evidence suggests that the interventional programmes are promising in supporting community reintegration following acute care rehabilitation among SCI survivors. There is a need to develop new programmes or modify pre-existing interventions to explicitly focus on critical aspects of community reintegration. Interventional programmes that are feasible in low-resource settings are required. Moreover, establishment of the effectiveness of the interventional programmes using a larger sample is warranted.



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## Tables

Table 1: Characteristics of the included studies

| Author, Year, Country   | Objective of the study  | Study design                             | Participants characteristics   | Setting                             | Quality of evidence |
|---|---|--|--|-------------------------------------|---------------------|
| Moon, Jung, Kim, Jang, & Cho, 2021, Korea <sup>26</sup>                 | Development and evaluation of the Korean version of a hospital-based transitional rehabilitation programme using daily living at home for patients with spinal cord injury.   | Mixed-method                             | Sample (M/F): 5(2/3)<br>Age (Mean/SD): 37(14.8)<br>Level of injury: Not Reported                                       | Hospital-based                      | Weak                |
| Coker et al., 2019, USA <sup>36</sup>                                   | Evaluation of the effectiveness of a replicable group treatment programme (psychologically based cognitive behavioural therapy) for improving self-efficacy following spinal cord injury in a single centre cohort of adults. | Parallel-arm randomized controlled trial | Sample (M/F): 81(66/15)<br>Age (Mean/SD): 48(12.8)<br>Level of injury: Not Reported                                    | Regional Spinal Cord Injury Centre  | Strong              |
| Nooijen et al., 2017, Netherlands <sup>35</sup>                         | Determine whether rehabilitation supplemented by a behavioural intervention to promote physical activity leads to better health, participation and quality of life.   | Randomized controlled trial              | Sample (M/F): 45(33/9)<br>Age (Mean/SD): 44(15)<br>Level of injury: Not reported                                       | Rehabilitation centre               | Moderate            |
| Kirby, Mitchell, Sabharwal, Mccranie, & Nelson, 2016, USA <sup>38</sup> | Determine whether community-dwelling veterans with SCI, who receive wheelchair skills training program in their own environment would significantly improve their manual wheelchair skills                                    | Randomized controlled clinical trial     | Sample (M/F): 106(101/5)<br>Age (Mean/SD): 48.1(13.6)<br>Level of injury:<br>Cervical: 13<br>Thoracic: 84<br>Lumbar: 9 | Community and Homes of participants | Moderate            |

|  |  |                           |  |   |          |
|--|--|---------------------------|--|---|----------|
|  | compared to an educational control group.  |                           |  |   |          |
| Zinman et al., 2014, Canada <sup>25</sup>                        | Evaluating the effectiveness of an outpatient community reintegration service to promote well-being and community participation following spinal cord injury.  | Mixed-method              | Sample (M/F): 21(10/11)<br>Age (Mean/SD): 46(11.4)<br>Level of injury: Not Reported                                    | Tertiary rehabilitation hospital          | Moderate |
| Oh & Park, 2013, Korea <sup>27</sup>                             | Describe community-based gait training for patients with incomplete spinal cord injury and then report on the results of the treatment.  | Case series               | Sample (M/F): 4(3/1)<br>Age (Mean/SD): 51.75(14)<br>Level of injury: Cervical: 1<br>Thoracic: 2<br>Lumbar: 1           | Community                                 | Weak     |
| Balcazar, Kelly, Keys, & Balfanz-Vertiz, 2011, USA <sup>37</sup> | Evaluate the impact of a peer mentoring intervention implemented in an urban rehabilitation hospital where six peer mentors were recruited to meet the needs of 28 young men with violently acquired spinal cord injuries. | Quasi experimental Design | Sample (M/F): 28(28/0)<br>Age (Mean/SD): 23(Not Reported)<br>Level of injury: Cervical: 4<br>Thoracic: 23<br>Lumbar: 1 | Urban Rehabilitation Centre and Community | Weak     |

Table 2: Characteristics of the intervention programmes

| Programme   | Purpose  | Composition  | Frequency/<br>Duration   | Service Providers   | Authors' Remark on<br>usefulness of the Intervention  |
|---|--|--|--|---|---|
| Transitional Rehabilitation Programme <sup>26</sup> | To increase Activities of Daily Living and participation and reduced the time of transition from the hospital to the community | Self-care, Home care, and Social participation   | Five times a Week/<br>Five Weeks   | Physiatrist,<br>Physiotherapist,<br>Occupational therapist,<br>Nurse, Social worker,<br>Psychologist, Orthoptist,<br>and Nutritionist | The intervention requires further evaluation to establish its effectiveness   |
| Reinventing Yourself <sup>36</sup>                  | To enhance personal self-efficacy  | Session 1: First Things First: Introductions and Identifying Goals; Session 2: Establish Goals: Prioritize and Address Needs; Session 3: Reframing How You Think and How You Feel; Session 4: Overcoming Barriers; Session 5: Using Character Strengths; Session 6: Gratitude and Maintenance.                         | Two hours each,<br>one session per<br>week/Six weeks   | Physical therapist,<br>Nurse, Social, and Spinal<br>Cord Injury Victims   | The intervention was effective in promoting self-efficacy for a short period (six weeks). Further evaluation is required.   |
| Behavioural Intervention <sup>35</sup>              | To promote the amount of everyday physical activity following discharge from inpatient rehabilitation                          | Feedback on daily wheelchair activity, formulation of action plans and coping strategies, home visit, and provision of additional relevant information requested by the participant  | 13 sessions (2<br>sessions per<br>months for 5<br>months, then 1<br>session per month<br>for 3 months) | Physical therapists and<br>occupational therapists  | The intervention was effective in eliciting a behavioural change toward a more active lifestyle and improved social participation among people with subacute spinal cord injury |
| Manual Wheelchair Skill Training <sup>38</sup>      | To promote community participation using wheelchair skills among spinal cord injury victims                                    | Rolling forward 10m in a space; rolling forward 10m in 30 seconds; rolling backwards 5m; turning 90° while going forward; turning 90° while going backwards; turning 180° in place; side-to-side manoeuvres; passing through a revolving door in both directions; reaching a 1.5m high object; picks up an object from | 30 - 45 minutes 3<br>times a week/ Five<br>Weeks   | Physical therapist,<br>Therapist Assistant,<br>Nurse and Informal care<br>giver   | The intervention improves wheelchair skills capacity; however, it has small impact on participation.  |

|  |  |   |  |  |  |
|--|--|---|--|--|--|
|  |  | the floor; relieves pressure on buttocks; transfers from a wheelchair to bench and back inside; folds and unfolds wheelchair; rolls 100m; avoidance moving obstacles; climb a 5° slope; descends a 5° slope; climbs a 10° slope; descends a 10° slope; rolls 2m over a 5° side slope; rolls 2m on soft ground |  |  |  |
| Community Reintegration Outpatient Programme <sup>25</sup> | To promote well-being and community participation following spinal cord injury   | Self-care and you, Adjustment and transition, Stress management, Problem solving, Emotions, Self-talk, Communication, Energy management, Pain management, Community outing, Hope and happiness, Resources/visual roadmap  | Once per week for 120 minutes/ 12-week           | Occupational therapist and Social worker   | The intervention has the potential to improve well-being in persons with spinal cord injury, however, there is a need to identify strategies to maintain long-term gains   |
| Community-based Ambulation Training <sup>27</sup>          | To reinforce walking skills and provide better opportunities for returning to community life following spinal cord injury                            | Training on: 150 metre route; 200 metre route; 300 metre route; and 500 metre route   | One-hour session, six times per week/ Four weeks | Physiotherapist  | The intervention improves walking function of ambulatory patients with incomplete spinal cord injury and offers better opportunities for reintegration into community life |
| Peer Mentoring <sup>37</sup>                               | To serve as source of information and support for new spinal cord injury patients, based on the lived experiences older spinal cord injury survivors | Medical, Housing, Education, Driving, Transportation, Recreation, Employment, Relationship, Sexuality, Financial, Emotional distress, Public accessibility, Supplies, Immigration, Relationship with mentors, and other relevant topics   | One-hour per week/ One year                      | Physiatrist, Physiotherapist, Occupational Therapist, Nurses, Recreational Therapist | The programme was shown to improve community participation among individuals with violently acquired spinal cord injury.   |



Table 3: Comparison among the programmes based on the critical components of community reintegration and perceived strengths and limitations of the interventions

| Programmes   | Housing and household | Mobility | Recreation | Health maintenance | Pain management | Sexuality | Employment | Identified strengths  | Identified limitations  |
|--|-----------------------|----------|------------|--------------------|-----------------|-----------|------------|---|---|
| Transitional Rehabilitation Programme <sup>26</sup>        | ✓                     | ✓        | ✓          | ✓                  | ✗               | ✓         | ✓          | Holistic and can be customised to the user's needs                                | Designed for persons with functional upper limbs                                  |
| Reinventing Yourself <sup>36</sup>                         | ✗                     | ✗        | ✗          | ✓                  | ✗               | ✗         | ✗          | Peer support, experiential learning, and individualized support                   | Educational, devoid of performance-based activities, and focuses only on the self |
| Behavioural Intervention <sup>35</sup>                     | ✓                     | ✓        | ✓          | ✓                  | ✗               | ✗         | ✗          | Holistic, individualised, includes home visits                                    | Peer support and experiential learning were not integral to the programme         |
| Manual Wheelchair Skill Training <sup>38</sup>             | ✗                     | ✓        | ✗          | ✗                  | ✗               | ✗         | ✗          | Practical application of wheelchair use   | Short practice time   |
| Community Reintegration Outpatient Programme <sup>25</sup> | ✗                     | ✗        | ✗          | ✓                  | ✓               | ✗         | ✗          | Experiential learning, peer support, and reflective activities                    | A pilot programme devoid of family and social roles                               |
| Community-based Ambulation Training <sup>27</sup>          | ✗                     | ✓        | ✗          | ✗                  | ✗               | ✗         | ✗          | Mimics real-life scenario   | Designed for persons with functional limbs  |
| Peer Mentoring <sup>37</sup>                               | ✓                     | ✓        | ✓          | ✓                  | ✗               | ✓         | ✓          | Source of employment for the mentors and social and moral support for the mentees | Does not include performance-based activities                                     |

Figure

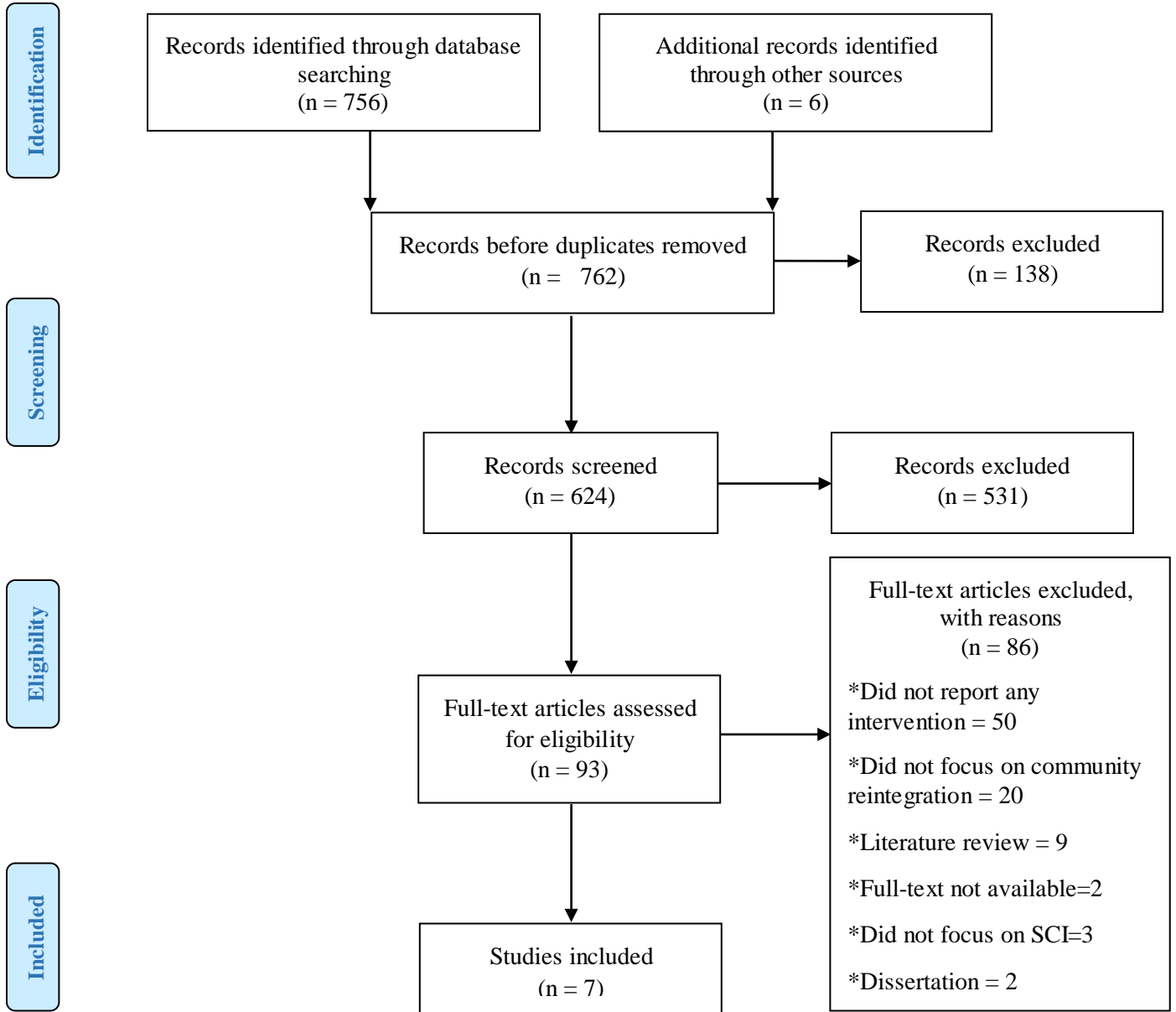


Figure 1: PRISMA flow diagram

## Appendix

### Appendix 1: Search terms

| Serial Number | Database       | Search terms   |
|---------------|----------------|--|
| 1             | Medline        | (exp Spinal Cord Injuries/) AND (community reintegration.mp.) AND (exp Community Participation/ or exp Social Participation/)  |
| 2             | CINAHL         | ((MH "Spinal Cord Injuries") OR (MH "Spinal Injuries")) AND ((MH "Community Reintegration") OR (MH "Social Participation") OR (MH "Work Engagement"))  |
| 3             | Web of Science | (ALL=(spinal cord injury)) AND (ALL=(rehabilitation)) AND ALL=(community integration)  |
| 4             | APA PsycINFO   | (Spinal cord injuries) AND (Community reintegration OR Participation)  |
| 5             | Global Health  | (spinal cord injury.mp. [mp=abstract, title, original title, broad terms, heading words, identifiers, cabicodes]) AND ((community reintegration.mp. [mp=abstract, title, original title, broad terms, heading words, identifiers, cabicodes]) OR participation.mp. [mp=abstract, title, original title, broad terms, heading words, identifiers, cabicodes]) |
| 6             | Sabinet        | Spinal cord injury AND (Community reintegration OR Participation OR Quality of life OR Community rehabilitation program OR Outpatient rehabilitation program)  |