Abstract

Defining an Age Cut-Off for Older Offenders: A Systematic Review of Literature

Background: In the literature, 65 years is commonly used as the age to designate an older person in the community. When studying older prisoners, there is much variation. The aim of this systematic review was to investigate how researchers define older offenders and for what reasons.

Methods: We reviewed articles on health and well-being of older offenders to assess terminology used to describe this age group, the chosen age cut-offs distinguishing younger offenders from older offenders, the arguments provided to support this choice as well as the empirical base cited in this context.

Results: Our findings show that the age cut-off of 50 years and the term 'older' were most frequently used by researchers in the field. We find seven main arguments given to underscore the use of specific age cut-off delineating older offenders. We outline the reasoning provided for each argument and evaluate it for its use to define older offenders.

Discussion: With this review, we hope to stimulate the much-needed discussion advancing towards a uniform definition of the older offender. Such a uniform definition would make future research more comparable and ensure that there is no ambiguity when researchers state that the study population is 'older offenders'.

Keywords: Older Prisoners, Older Offenders, Accelerated Aging, Somatic Health, Mental Health

Introduction

In Gerontology literature, 65 years is the commonly used age cut-off to begin defining an older person, while the United Nation uses 60 years as the age cut-off (United Nations et al., 2015). Within this categorization as an older person, this group is further divided into the young-old (65 – 74 years), the middle-old (75 years – 84 years), and the oldest-old (85 years and older) (Lee et al., 2018, Alterovitz and Mendelsohn, 2013). At a minimal level, consistent age cut-off allows common understanding on who forms a particular population. At greater levels, it allows comparative research and formulation of public policy for that age group and its sub-groups. A uniform definition for 'older offenders' is an essential first step to improve healthcare for this population (Ahalt et al., 2013) as well as research and policies. This need has been repeatedly expressed by experts in the field of correctional health care (Kakoullis et al., 2010, Williams et al., 2012b). However, we still lack agreement as to at what age a prisoner should be deemed 'older'.

The definition of an older offender is usually based on chronological age, using a certain age cut-off to differentiate between younger and older offenders. In available literature on older prisoners, the cut-off age varies from 45 years to 65 years (Yorston and Taylor, 2006, Aday and Krabill, 2012, Stojkovic, 2007). An explanation for the discrepancies in age cut-offs could depend on the data used by the researcher (Uzoaba, 1998). Other common reasons for choosing lower age cut-offs are based on the assumption that prisoners are subjected to premature aging, often called 'accelerated aging' (Cipriani et al., 2017). However, the empirical evidence supporting this theory of 'accelerated aging' is unclear (Kakoullis et al., 2010). Thus, the chosen age cut-offs as well as the provided arguments to support this choice vary highly, making comparisons of data across studies difficult.

This missing shared understanding of the group of older offenders hinders the advancement of research on the health of older prisoners (Kakoullis et al., 2010) and consequently makes it difficult to plan health services (Hayes et al., 2012) as well as related issues such as programming (Aday, 1994), housing, and transition planning (Jang and Canada, 2014). This is of particular importance given the current rising trend in the numbers of older prisoners. They are proportionally the fastest growing age group in prison systems around the world (Di Lorito et al., 2018, Baidawi and Trotter, 2016, Aday and

Krabill, 2012, Skarupski et al., 2018). Presently, prisoners over the age of 50 years, for instance, make up between 10% of the prison population in Ireland, 13% in the UK, and 18.8% in the USA, and 25% in Italy (Di Lorito et al., 2018). At the same time, they suffer from a greater disease and disability burden compared to both younger prisoners and older community-dwelling adults (Fazel et al., 2001, Di Lorito et al., 2018). Consequently, they are a population with high health care needs and the main drivers of rising prison health care costs (Yarnell et al., 2017). Specifically, it is estimated that the cost of incarcerating an older prisoner is two to three times that of a younger prisoner within the American correctional system (Maschi et al., 2013). With the already very limited resources in prison settings, it is therefore important to provide services that are adequate and cost-effective. To do so, it is necessary to target specific groups based on their needs. However, the available data on health care needs of older prisoners is scarce (Di Lorito et al., 2018) and the integration of the available literature is often hampered through missing agreements on how to define the older prisoner.

This review aims at providing a much needed overview of the current understandings on how older offenders are defined by different research groups. It highlights the chosen age cut-offs, the terminology used to describe this age group as well as the arguments provided to support this choice. Specific focus will be given to the literature cited to support each argument since researchers in the field have raised concern about the empirical evidence being unclear. In doing so, this paper fills a research gap by answering multiple calls to advance towards a uniform definition of older offenders.

Methods

This review follows the guidelines of the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) (Moher et al., 2015). The terms prisoner, inmate, offender, detained person, and person deprived of liberty are used interchangeably throughout this article. By using these terms, we describe people that are detained in correctional facilities such as prisons and jails and forensic psychiatric clinics.

Eligibility Criteria

The eligibility criteria were defined a priori. We set no time limit for the articles published and retrieved those published until 31st of January 2018. Opinions, dissertations, books, and book chapters were not included. Empirical peer-reviewed articles, written in English language, were included and reviewed against three inclusion and three exclusion criteria. Inclusion criteria were: (1) The studied population was persons deprived of liberty. (2) Older offenders had to either be the main study population or specifically mentioned as a sub-group. (3) The study had a focus on health and well-being of older offenders. Exclusion criteria were the following: (1) Articles that examined juvenile prisoners, ex-prisoners, parolees, veterans, or former war prisoners as their main study population. (2) A paper was also excluded, if older offenders were not specifically mentioned as a sub-group. (3) Lastly, papers on older offenders that were not focusing on their health and well-being (mental and/or somatic health) but rather on for instance criminogenic factors or offence patterns were also excluded.

Literature Search

The systematic search was conducted using the four electronic databases PubMed, PsycInfo, SocINDEX, and CINAHL. We additionally scanned the first 10 pages of Google Scholar to ensure that we had not missed important literature, however limited ourselves to 10 pages for the sake of feasibility. Two categories of search terms were used and combined using the 'AND' operand. Terms within the two categories were combined using the 'OR' operand. The first category of search terms aimed at yielding studies that related to the population of older offenders *(older prison* OR older offender* OR older inmate* OR elder* prison* OR elder* offender* OR elder* inmate* OR old prison* OR old offender* OR old inmate* OR ageing prison* OR ageing offender* OR ageing inmate* OR aging prison* OR aging offender* OR aging inmate*)*. The second category was chosen to select studies on mental or somatic health of older offenders *(health OR psycholog* OR mental health OR psychiatr*)*. The strategy was consistently used for all databases, except where minor modifications were needed to respond to the different characteristics of the databases. The initial title and abstract screening was done by the main author (HM) and one co-author (LM) applying the above-mentioned inclusion and exclusion criteria.

Study Coding

The consequent full text screening followed a data extraction form developed for this study. The main author as well as co-authors screened all articles to ensure reliability of extracted information. The coders worked independently and discrepancies were resolved through discussion to achieve consensus. The information that was obtained encompassed aspects such as characteristics of the article (title, year of publication, journal, country of study, funding, conflict of interest) and properties of the study (methodological approach, sampling methods, study design, type of data, and data collection method). Data on characteristics and properties of the study were analyzed descriptively. Further information obtained related to the research questions such as whether the older offender population was the main study population or a sub-group, which age cut-off was applied, what reasons were stated in relation to the chosen cut-off, and what studies were cited in connection with that. The different reasons were grouped into associated categories and the provided citations were searched for underlying empirical studies. In the search for empirical evidence, we took two steps (1) For each article in our sample, we checked the citations that were provided to substantiate the argument when choosing a cut-off. (2) These citations were further examined if (a) they were able to either directly support the fact stated or (b) they were citing any empirical literature to support this argument. For this part, we limited ourselves to empirical evidence going back to the year 1990. We outline the empirical evidence that was provided to back up each group of arguments.

Results

Study Selection

The total number of studies that was identified through our search strategy was 2327 of which 2243 were identified through electronic databases and 84 through Google Scholar. After removing the duplicates, we screened 2069 titles and abstracts. This resulted in 256 articles that were assessed for eligibility against the inclusion criteria. The final sample of studies that were included consisted of 100 articles (see Figure 1 and Table 1).

Study Characteristics

The publication years ranged from 1985 to 2017 with most of the studies published after the year of 2000. The majority of all studies were conducted in the United States (n=53), followed by the

UK and Ireland (n=21), and Continental Europe (n=12). Only 3 studies were carried out in Canada, another 4 in Asia and the Middle East, and 7 in Australia and New Zealand. The main issues studied encompassed mental health including substance related disorders (n=35), both somatic and mental health (n=26), general health and well-being (n=22), end-of-life care/palliative care/dying in prison (n=7), and somatic health (n=6). Four studies that could not be grouped into one of these categories were classified as 'other'. These encompassed access to health care, gambling in relation to somatic and mental health, the impact of imprisonment on older offenders' well-being, and nutrition and exercise.

Twelve studies used qualitative methodology, 79 quantitative methodology, and 9 employed a mixed methods approach. The most dominant sampling technique was purposive/convenience sampling (n=70), 18 studies used all data from a certain population, 10 studies applied random sampling, and two studies combined two sampling methods (all data from a certain population and random sampling of a comparative group). Twenty-eight studies made use of documents (medical records, charts, forms) to collect their data, 21 used screenings and diagnostic tools, 12 conducted semi-structured interviews, 12 used self-report surveys and questionnaires, 1 study held focus groups, and 26 studies used a combination of data sources. The study sample size ranged from 7 to 234031 participants with the majority of studies (n=40) having less than 100 subjects, and only 14 studies had over 1001 participants. The percentage of older participants within the sample ranged from as little as 1.6% to 100% whilst most of the studies (n=82) conducted their research on older offenders only.

Terminology used for older prisoners and age cut-offs

The terminology that the authors of these included studies used to describe this population varied. Forty-six studies used the term 'older', 14 used 'elderly', 2 'geriatric', 1 'mature', 1 'aging' and 36 studies used multiple terms (e.g. older, elder) with interchangeable meanings (see Figure 3). We conducted a Pearson's Chi Squared Test to check whether there was a relation between the applied age cut-off and the terms used. Included were only studies that used one cut-off and a specific term. There was no significant interaction found (X^2 (30), $p = 0.09$).

The age cut-offs applied for the group of older offenders extended from the age of 40 to the age of 65 (see Figure 2). Among the included studies, the age of 50 was by far the most frequently

chosen cut-off (n=42), 55 years was applied by 17 studies, and the age of 60 by 16 studies. Only one study used the age of 40 (Barry et al., 2014), 6 the age of 45 (Bishop et al., 2014b, Sodhi-Berry et al., 2015, Bishop and Merten, 2011, Phillips et al., 2011, Allen et al., 2013, Gates et al., 2017), 3 used 62 years (Paradis et al., 2000, Rosner et al., 1991, Rosner et al., 1985) and four used 65 years (Barak et al., 1995, Crawley and Sparks, 2006, Crawley and Sparks, 2005, Curtice et al., 2003). Within the category 'other', two studies presented data on all age groups while analyzing older offenders as specific sub-group (Taylor and Parrott, 1988, Harzke et al., 2010), one provided an average age of the older offenders included in the study (Aday, 1994), and 8 studies used multiple cut-offs for older offenders,e.g. 60 and 65 (Fazel and Grann, 2002), 50 and 60 (Colsher et al., 1992, Hayes et al., 2012), 45 and 50 (Baidawi et al., 2016b, Baidawi and Trotter, 2016, Baidawi, 2016, Baidawi et al., 2016a), and 45 and 55 (Merten et al., 2012).

Rationales for choosing age cut-offs

For each study, we checked why the specific age cut-off had been chosen. In almost half of all studies included (n=44), the researchers had named no reasons for choosing their selected age cut-off (see for example: Colsher et al., 1992, Aday, 1994, Curtice et al., 2003, de Guzman et al., 2012, Sullivan et al., 2016). The remaining studies where the researchers have provided a reason for their chosen age cut-off are discussed below and an overview of the rationales is presented in Figure 4. If an article mentioned multiple reasons for choosing a cut-off, they were counted in all possible categories.

As the majority of prisoners are young and the prison environment is adapted to this group, prisoners could feel relatively old at a younger age and age issues (e.g. physical changes) may stand out earlier. Three studies provided reasons linked to this idea of how being older within a young environment may make age related issues more pronounced than what would generally be visible when living in the community. This was categorized into 'relative age' (Baidawi et al., 2016b, Wilson and Vito, 1986, Stoliker and Varanese, 2017).

Studies that described arguments for 'pragmatic reasons' outlined the issue of small numbers of possible participants (Washington, 1989, Sodhi-Berry et al., 2015, Barry et al., 2014, Rodriguez et al., 2017, Coid et al., 2002) and for these reasons chose lower cut-offs, which allowed them to assure statistical power (Sodhi-Berry et al., 2015).

Other researchers took age cut-offs provided by general institutions or representing general assumptions ('institutional cut-off'). For instance, Fazel and Grann (2002) used the cut-off (i.e. 65 years) that is used in geriatric psychiatry. Two research groups were bound to a certain age cut-off (i.e. 50 and 60 years) by a special facility for older inmates, in which they were conducting their research (McGrath, 2002, Marquart and Merianos, 2000). Other studies used age cut-offs that determined the eligibility for social security retirement benefits (Rosner et al., 1985, Rosner et al., 1991, Crawley and Sparks, 2005, Crawley and Sparks, 2006, O'Hara et al., 2016) or definitions and recommendations provided by criminological or correctional institutes (Barry et al., 2016a, Sodhi-Berry et al., 2015, Iftene, 2016).

One research group adjusted the age cut-off for indigenous people due to their 'shorter life expectancy' in comparison to the general Australian population (Baidawi et al., 2016b, Baidawi and Trotter, 2016, Baidawi et al., 2016a, Baidawi, 2016). Their used age for older indigenous prisoner was 45 years.

The category 'other' was used for the following: one study provided an average age only (Aday, 1994) and one study based their age cut-off on clinical experience of one author (McLeod et al., 2008).

Rodriguez et al. (2017) conducted a neuropsychological study and based their cut-off decision on findings of age-related changes in 'cognitive functioning'.

The concept of 'functional definition' refers to studies analyzing the impact of different ages with issues such as the burden on the health care system, rates of mental disorders and health and social needs. The age cut-off was determined based on the age that was linked to the biggest change in the dataset e.g. increase of rates of disorders (Hayes et al., 2012, Taylor and Parrott, 1988, Harzke et al., 2010, Rodriguez et al., 2017).

Twenty-six studies justified their age cut-off choice by stating that these cut-offs were the most frequently or widely used in research on older offenders. These studies also used the specific age cut-off to be consistent with previous research which represented the concept called 'frequent/common' (see for example: Kerber et al., 2012, Leigey and Hodge, 2012, Leigey and Johnston, 2015, Loeb and Steffensmeier, 2006, Loeb et al., 2008, Loeb and Steffensmeier, 2011).

Lastly, 30 studies stated the concept of 'accelerated aging'. Their stated reasons can be taken together as a comparison between the health status of prisoners and people living in the community, which would indicate a ten to fifteen year difference. Prisoner populations are therefore thought to have a biological age that is comparable to the age of community populations who are ten to fifteen years older. This poorer health status is described by the greater burden of illness, disability, functional impairment, chronic conditions, and comorbid conditions (see for example: Allen et al., 2008, Barry et al., 2016b, Bishop et al., 2014a, Combalbert et al., 2017, Falter, 1999, Heidari et al., 2017, Lightbody et al., 2010, Maschi et al., 2011, Phillips et al., 2009, Trotter and Baidawi, 2015, Wangmo et al., 2016, Williams et al., 2014, Williams et al., 2006)

The causes that are thought to create this difference in health status are believed to be based on factors linked to the prisoners' life before imprisonment and/or imprisonment itself (Loeb et al., 2007, Merten et al., 2012, Courtney and Maschi, 2013, Handtke and Wangmo, 2014, Davoren et al., 2015, Sodhi-Berry et al., 2015, Barry et al., 2016a, Nowotny et al., 2016, O'Hara et al., 2016, Wilkinson and Caulfield, 2017). Offenders have been shown to be more likely to originate from disadvantaged backgrounds with a lower socioeconomic status. Moreover, they frequently have a history of excessive drug and alcohol use, poor nutrition/ eating habits, personal neglect, lack of access to medical care, stressful life experiences, and a general tendency to engage in risky behaviors. It is further hypothesized that imprisonment itself has an impact on prisoners' health through high distress, separation from family, risk of isolation, fear of victimization and decreased access to health care during imprisonment when compared to people living outside prisons.

Empirical Evidence for age cut-off rationales

Frequent/Common: the most frequently cited study in this group was the review conducted by Loeb and AbuDagga (2006). It was provided as evidence by six studies using the age cut-off of 50. Their review reports, amongst others, on the "Frequency and Percent for Age Used to Denote Older Inmates" and presents 50 as the most commonly used age cut-off. The remaining studies did not cite any evidence that specifically outlined the frequency of age cut-offs in research of older offenders but stated comments such as "to be consistent with other studies". Three studies did not provide any citations.

Shorter Life Expectancy: The basic literature provided was the statistics on deaths published by the Australian Bureau of Statistics (2011). This study presents the life expectancy of the Australian population while differentiating between indigenous and non-indigenous people. Three additional studies did not provide any further evidence but lead to the same statistics.

Institutional Cut-off: The four studies referring to the state retirement age and the one referring to the cut-off in geriatric psychiatry did not cite a source. The age cut-offs defined by access to a special facility for older inmates did not outline their admission criteria. Three research groups referred to articles published by the criminological and correctional institutes of Australia, Canada, and the United States. The recommendation for age cut-offs of older indigenous prisoners provided by the Australian Institute for Criminology is based on the 'shorter life expectancy' argument (Baidawi et al., 2011).The reports cited from Canadian and American Institutes discussed the definition problem and the concept of 'accelerated aging' (Anno et al., 2004, Uzoaba, 1998). The empirical evidence cited in these reports was therefore considered in the corresponding reasoning groups (i.e. 'accelerated aging' and 'shorter life expectancy').

Pragmatic Reasons: there was not literature cited in this group.

Relative Age: the one review cited claims that most literature reviewed show that prisons are designed for younger and physically active inmates (Morton, 1992). Since we limited ourselves to review literature back to 1990 due to our resource limitations, we did not screen the literature cited in this 1992 review and we did also not consider the other review cited (Rubenstein, 1984).

Cognitive Functioning: The neuropsychological study conducted by Rodriguez et al. (2017) referred to age-related change in cognitive functioning as a marker in aging. The two studies cited show evidence of declining executive functioning occurring most dominantly around the age of 50 (De Luca et al., 2003, Zhou et al., 2011).

Functional Definition: Rodriguez et al. (2017) points out the so-called 'functional definition' which was based on (Stojkovic, 2007) referring to (Thomas et al., 2005) who cited an unpublished study conducted by the Florida Department of Corrections. They analyzed the impact of certain ages on their correctional health-care system, which showed a clear change at the age of 52-53. Inmates at this age accessed the health-care system far more frequently while this increase remained relatively

stable for the following higher age groups. Based on this analysis, the Florida Department of Corrections defined the cut-off age for older offenders at 50 (see Thomas et al., 2005). Two studies (Harzke et al., 2010, Taylor and Parrott, 1988) analyzed the rates of mental and physical disorders for older offenders while comparing them with all other age groups in 10-year age brackets. Both research teams reported that the biggest changes occur in the fifties: while they did not calculate the exact threshold, they noticed this difference starting with the 55 to 64 age group. Additionally, one study investigated the health and social needs of older prisoners using the two age cut-offs 50 and 60. Based on their data, they described the age 50 to 54 as a transitory period but concluded the age of 50 as a useful cut-off since this age group was not drastically different to the over 60s (Hayes et al., 2012).

Other: no literature was cited in this group since one study provided an average age and one referred to the clinical experience of an expert.

Accelerated Aging: as this concept was the argument noted by the majority of studies, the amount of literature cited in relation was extensive. However, the empirical evidence cited in our sample to support the concept of 'accelerated aging' is scarce and can be split up in (1) direct comparisons and (2) indirect comparisons of health status. Direct comparisons between the health status of incarcerated and non-incarcerated populations were conducted by Loeb et al. (2008) and Combalbert et al. (2016). In the study performed by Loeb et al. (2008), the authors compared the health status of a sample of community-dwelling older men with a group of incarcerated individuals. The community sample was on average 15 years older while the health status between both samples was similar. The study conducted by Combalbert et al. (2016) also found a 10 year difference between the prisoner's and the community group's average age, but no difference in health status. Both studies therefore concluded that this indicates a 10 or 15 years difference in health status between incarcerated and non-incarcerated individuals. Another study cited in relation to health status, provided indirect comparisons between their own study results, representing the prisoners' sample, and prevalence rates of the general population drawn from other publications. They concluded that the health of older prisoners is worse, compared to younger prisoners and community-dwelling individuals of the same age (Fazel et al., 2001).

Discussion

This systematic review surveyed literature on the health and well-being of older prisoners to investigate how researchers have so far defined the older offender population. Our findings show that the age cut-off 50 and the term 'older' were the most frequently ones applied. We find eight main arguments provided for a specific age cut-off delineating older offenders: 'accelerated aging, 'relative age', 'functional definition', 'pragmatic reasons', 'frequent/common', 'institutional cut-off', 'shorter life expectancy', and 'cognitive functioning'.

The majority of studies used the term 'older' to describe this population. This is in line with the recommendations provided by major associations such as the American Psychological Association and the American Geriatrics Society who favour the use of more neutral terms like 'older people' and 'older adults' as opposed to terms such as 'seniors' or 'elderly' (Lundebjerg et al., 2017, American Psychological Association, 2010). Moreover, other studies that surveyed older people found that respondents preferred to be described with terms such as 'seniors', 'senior citizen', 'retiree', 'senior', and 'older adult' (Chafetz et al., 1998, Misurak et al., 2002). Misurak et al. (2002) additionally reviewed the use of terminology in scientific journals, which showed authors' tendency to use 'older adults'. Taken together, this suggests similar developments amongst authors of scientific articles, major associations, and older adults themselves to use more neutral descriptions such as 'older people' or 'older adults'.

A large proportion of the studies analyzed within this review used multiple terms (older, elder, elderly, geriatric) to describe the same population while the use of certain terminology (e.g. older, elderly, geriatric) could not be linked to specific age groups. Even though this gives a pleasant variety for the reader, it is overall a rather confusing use of terminology and the distinct terms might be understood differently by readers. To increase accuracy and congruency, we therefore suggest for future studies on health of older offenders to utilize the terminology 'older' to describe the target population.

As noted earlier, the researchers' reasoning to choose certain cut-offs were divided into eight categories. It was striking that in almost half of the included studies, researchers did not name any

reasons why they chose certain cut-offs. Further, out of the arguments we consider the categories ‘frequent/common’, ‘pragmatic reasoning’, ‘relative age’ and ‘institutional cut-off’ are not useful in establishing a common age cut-off due to their variability on context and weak reasoning associated with its usage. However, we consider the concepts of ‘cognitive functioning’ ‘accelerated aging’, ‘functional definition’, and ’shorter life expectancy’ as promising approaches to advance towards a shared definition of older offenders. These four arguments consider the characteristics of the prisoner population by assessing their morbidity and mortality. We discuss each of these arguments in detail below.

The actual age cut-offs that were chosen for older offenders ranged between the age of 40 and 65 with the majority of studies using the age cut-off of 50. Loeb and AbuDagga (2006) described this trend of most studies utilizing the age of 50 to distinguish between the younger and older age group. The ‘frequent/common’ tendency has continued to date and has been specifically named as a reason for a chosen cut-off, making research more comparable and to be able to integrate results across single studies. However, this rationale was used to support different age cut-offs such as the age of 55 (Williams et al., 2010a, Williams et al., 2010b, Bolano et al., 2016) and the age of 60 (Fazel et al., 2004, O'Hara et al., 2016, Fazel and Grann, 2002). This reasoning consequently did not increase comparability of studies but raised similar diversity in chosen age cut-offs.

The ‘pragmatic reasoning’ included the need to artificially lower the age limit in light of the number of older people in prison, which although growing, continues to form a minority within correctional systems. When conducting quantitative research on older offenders, researchers face the challenges of recruiting enough subjects within an already limited number of possible participants. On the one hand, this enables the researcher to conduct quantitative analyses with enough statistical power. On the other hand, artificially reducing the age cut-off for the reason of ensuring a bigger sample leads to presenting results of a certain age-group but not necessarily the age-group of interest. This could, consequently, slow down advances regarding data and knowledge on older offenders. Thus, such ‘pragmatic reasoning’ is, in our opinion, not useful and should be avoided.

The ‘relative age’ reasoning states that correctional facilities are designed for younger and physically active inmates and are not easily adaptable to the needs of older prisoners. Older prisoners are more likely to suffer from functional limitations and restricted by a lack of accessibility within the institutions (Morton, 1992). Even though “certain aspects of the prison environment can exacerbate the functional impairment” (Williams et al., 2006), penal institutions worldwide are highly diverse, which means that these aspects of the prison environment also differ. The impact of the prison environment on functional impairment is therefore difficult to compare and the applicability of the ‘relative age’ reasoning consequently questionable. Nevertheless, older prisoners’ needs are important factors when planning healthcare on a more individual level. A prison environment that does not take into account physical limitations such as reduced mobility, impaired hearing and vision, infirmity, or incontinency can create a situation that is described as ‘double punishment’ (Baidawi et al., 2011). Thus, we consider this argument as an important consideration when planning institutional care but not helpful to promote a shared understanding of older offenders in research.

Studies that adopted ‘institutional cut-offs’ were either based on cut-offs applied to the general population, admission criteria of certain units, or recommendations by criminological or correctional institutes. The latter used explanations such as ‘accelerated aging’ and ‘shorter life expectancy’ (see below) while researchers that applied cut-offs of the general population referred to official retirement age without further explaining their reasoning. This group of arguments did refer to other concepts and did therefore not add any additional unique considerations.

‘Cognitive functioning’ changes over the course of life while the distinct domains are affected at different rates. For example, executive functioning is thought to decline around the age of 50 in the general population (De Luca et al., 2003, Zhou et al., 2011) and was used to draw an age cut-off in a study on cognitive performance of older offenders (Rodriguez et al., 2017). This data-driven approach to choose an age cut-off could also be useful in the more general discussion on how to define an older offender. Cognitive performance can be influenced by lifestyle factors such as physical activity, cardiovascular diseases, and diet (Baumgart et al., 2015). As the prisoner population is often described as one with a history of risky behaviors that are linked to increased morbidity, (see ‘accelerated

aging'), they could consequently be affected by greater cognitive decline at a younger age (Combalbert et al., 2017). It is therefore questionable to what extent data from the general population can be used to define an age cut-off in the prisoner population. Yet, data on age-related cognitive changes exclusively collected from the prisoner population could be utilized as indicators to draw an age cut-off for older offenders.

The phenomenon of 'accelerated aging' among prisoners was mainly brought up by studies that used lower age cut-offs such as the age of 50 and 55 for older offenders. The reason for this lower age cut-off was described as the discrepancy in health status between the prisoner population and the general population. Empirical evidence that was named to confirm this theory was scarce, as highlighted by other authors (Williams et al., 2012a, Gallagher, 2001, Kouyoumdjian et al., 2017). In total, three studies provided evidence on 'accelerated aging' through comparing the health status of non-incarcerated populations to the older offender population. They showed prisoners to have increased physical and psychiatric morbidity, which can be linked to 'accelerated aging' and early mortality (Loeb et al., 2008, Combalbert et al., 2016, Fazel et al., 2001). This was also confirmed by more recent studies that were not in our sample of empirical evidence (Di Lorito et al., 2018, Greene et al., 2018). However, other authors have argued that comparing the health status of prisoners with people living in the community of a different age group might be an oversimplification (Hayes et al., 2012).

The concept of 'accelerated aging' is closely linked to the 'shorter life expectancy' reasoning (Baidawi et al., 2016b, Baidawi and Trotter, 2016, Baidawi et al., 2016a, Baidawi, 2016). Authors from Australia adjusted the age cut-off for indigenous people down to the age of 45 whilst choosing an age cut-off of 50 for the remaining prisoners and justified this by the difference in life expectancy between indigenous and non-indigenous Australians. Following this idea, one approach would be to compare mortality and life expectancy of the prisoner population with the general population and to adjust the age cut-off accordingly. Yet, even though there is evidence that there is an increased mortality during the period after release from prison (Zlodre and Fazel, 2012), it is unclear in what way prisoners might be subjected to 'accelerated aging'. Kouyoumdjian et al. (2017) argue that

"adjusting a prisoner's age uniformly by 10 to 15 years (as the commonly advanced assertion suggests) would be overly simplistic, as age and sex seem to modify the effect of a history of incarceration on mortality rate and life expectancy" (p.8). Thus, even though the mortality risk for the prisoner population is higher for most of adulthood, this risk varies per age group and it is therefore difficult to give a general age-adjustment to all prisoners.

Finally, a consequence of the higher disease and disability burden amongst the older offender population, as mentioned above, is the high costs of providing health care (Ahalt et al., 2013). The impact of different age-groups on the correctional healthcare system has been analyzed by the Florida Department of Corrections (see Thomas et al., 2005) and was used by Rodriguez et al. (2017) to draw an age cut-off for older offenders. We grouped together arguments that used the idea of analyzing the effect of age onto aspects such as healthcare costs or rates of disorders to the concept 'functional definition'. An advantage of studies using datasets that comprise all age groups is that similarities and discrepancies between older and younger age groups can be outlined and the issues of older offenders can therefore be interpreted in a broader context. For example, Hayes et al. (2012) were able to identify the most pronounced changes in physical health, overall health, and social needs with age groups over 50 and therefore recommended drawing the cut-off at that age. Thus, age-related changes in, for instance, rates of mental disorder or prevalence rates become apparent that way. Of course, disadvantages can be greater expenses for data collection and analysis in a population that is hard to access and where research activity is limited. However, this might be a promising approach for the purpose of establishing a shared understanding of older offenders due to its potential to reveal age-related changes that are particular to the prisoner population.

Limitations

One limitation is that it is possible that we did not include all studies relating to the health of older offenders. This limitation could be due to the search terms used as well as available resources that allowed us to use English language data and four search engines only. We also did not screen reference lists of studies included in our review since 100 studies met our inclusion criteria and the additional work burden would have been unfeasible. Furthermore, we believed that our results would

not have changed even if we had screened the reference list for further studies. The main groups of arguments to define older offenders were evident much earlier during our data extraction process.

Moreover, we limited our analysis on how to define an older offender to chronological age only and did not explore any other constructions of age. Chronological age is a variable that is easy to obtain and therefore helpful for conducting research as well as for planning health care services on a broader level. However, the older population is known to be the most heterogeneous of all age groups (Atabay, 2009) and would therefore require additional subdividing to guarantee adequate allocation of health care services. One approach that is already being used in geriatrics is the use of diagnostic criteria to define a geriatric patient. For instance, the 'frailty syndrome' as proposed by Fried et al. (2001) could prove useful since it is linked to advanced age and higher health care needs. Future research should therefore consider evaluating additional ways to classify older offenders in order to further individualize and improve treatment.

Conclusions

'Accelerated aging' was described as a reason to use a lower age cut-off for older prisoners and is based on health status comparisons between prisoners and the general population. Health status included functional impairment and burden of illness and disability. Even though we categorized arguments for defining older offenders into differing approaches, they are interrelated. This was succinctly summarized by Williams et al. (2006) who noted that functional impairment predicts high healthcare costs, future functional decline, and mortality. Thus, to expand the conceptualization of accelerated aging, we suggest going beyond the comparison of health status only. The 'accelerated aging' concept would be enhanced if it incorporated the issues discussed in the additional rationales 'functional definition', 'shorter life expectancy', and 'cognitive functioning' that emerged through this review of literature. The arguments should consequently not be considered as stand-alone but as an enrichment to the concept of 'accelerated aging'. On this account, we recommend subsequent research activities pursue questions on issues such as age-related changes of prevalence rates of various diseases and cognitive functioning as well as life expectancy specific to the prisoner population.

Conflict of Interests

The authors declare that there is no conflict of interest.

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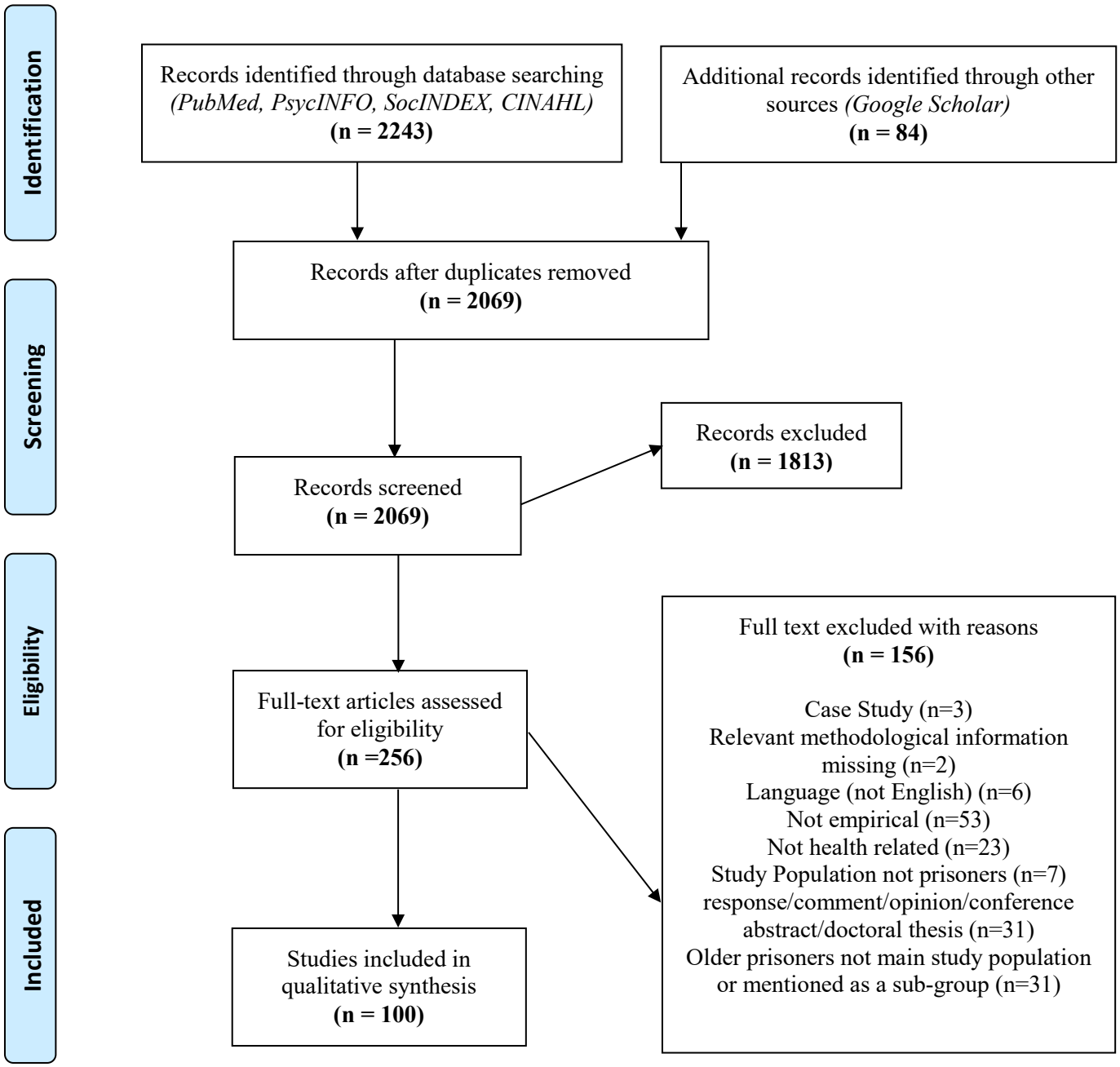
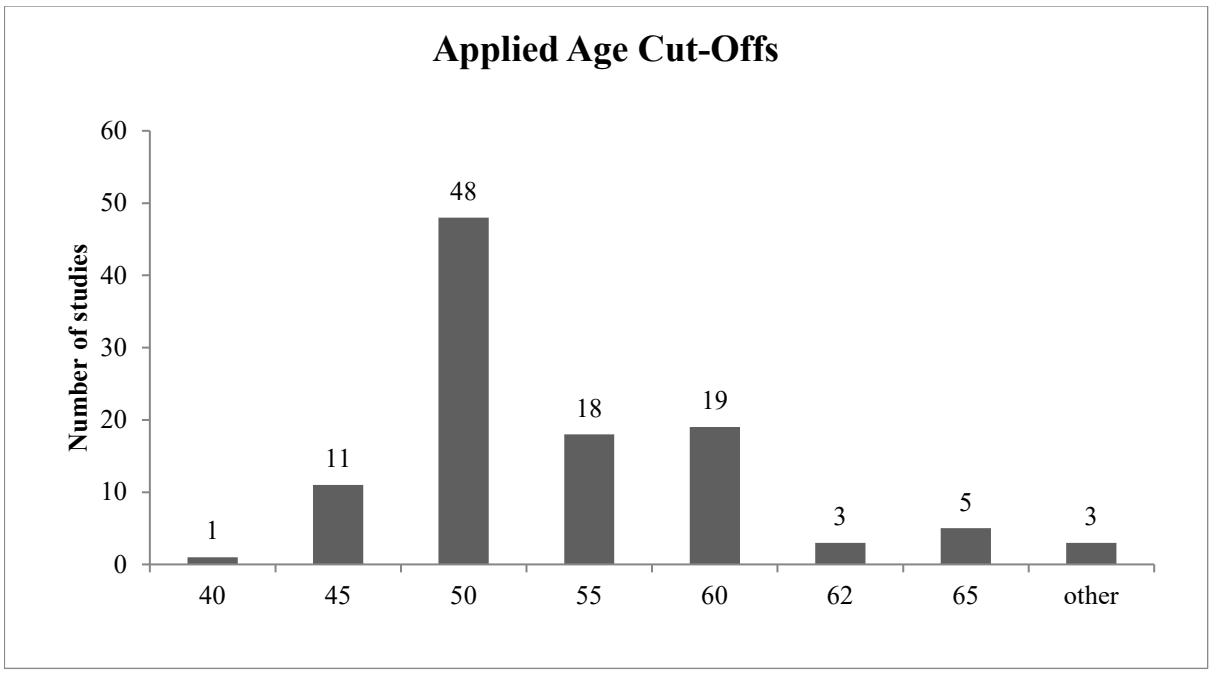
Figure 1. Selection of Studies



Adapted from: Moher D, Liberati A, Tetzlaff J, Altman DG, The PRISMA Group (2009). *P*referred *R*eporting *I*tems for *S*ystematic Reviews and *M*eta-*A*nalyses: The PRISMA Statement. PLoS Med 6(7): e1000097. doi:10.1371/journal.pmed1000097


Applied Age Cut-Offs
Number of studies
60
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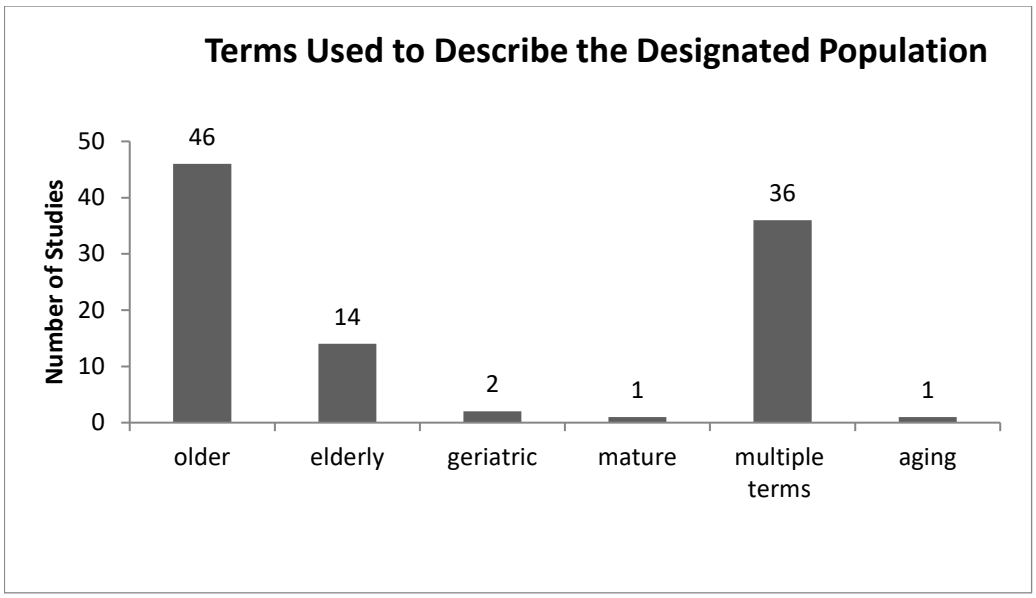
65
other


Terms Used to Describe the Designated Population
Number of Studies
50
40
30
20
10
0
46
14
2
1
36
1
older
elderly
geriatric
mature
multiple terms
aging

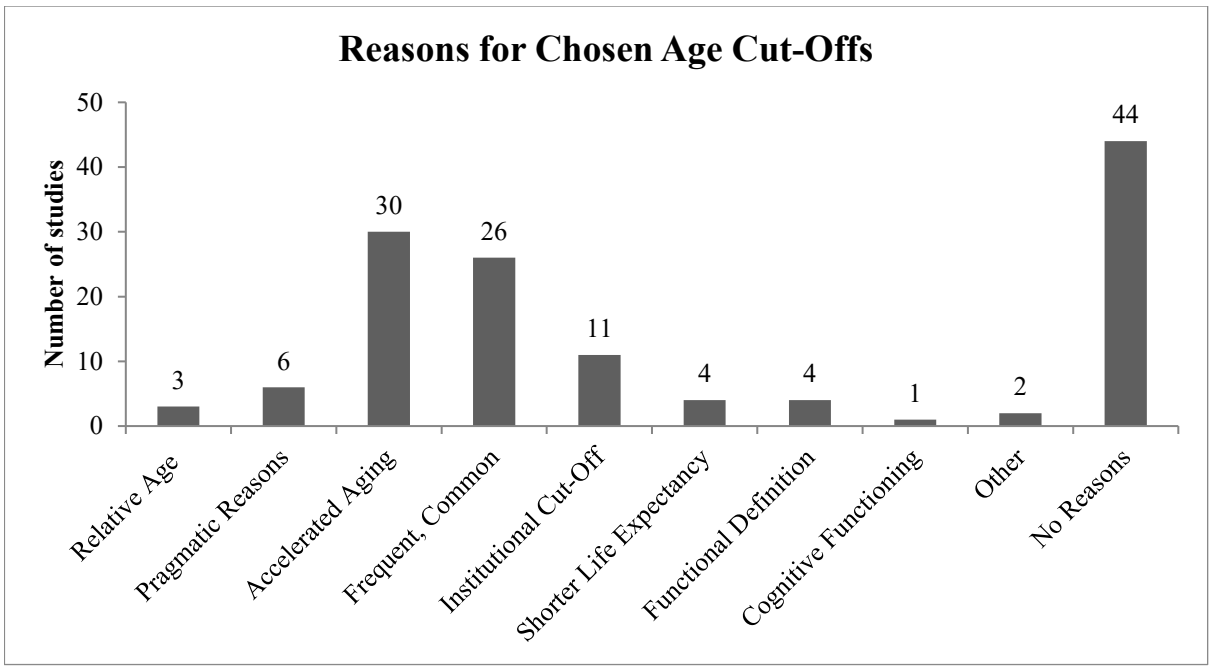

Reasons for Chosen Age Cut-Offs
Number of studies
50
40
30
20
10
0
3
6
30
26
11
4
4
1
2
44
Relative Age
Pragmatic Reasons
Accelerated Aging
Frequent, Common
Institutional Cut-Off
Shorter Life Expectancy
Functional Definition
Cognitive Functioning
Other
No Reasons

Table 1. Summary Characteristics of Included Studies

Paper ID	Title	Country of Study	Methodological Approach	Cut-off age
Aday (1994)	Aging in prison: A case study of new elderly offenders	USA	Qualitative	mean age
Aday (2005)	Aging Prisoners' Concerns Toward Dying in Prison	USA	Mixed Methods	50
Aday and Farney (2014)	Malign neglect: Assessing older women's health care experiences in prison	USA	Mixed Methods	50
Allen et al. (2013)	Does religiousness and spirituality moderate the relations between physical and mental health among aging prisoners?	USA	Quantitative	45
Allen et al. (2008)	Religiousness/Spirituality and Mental Health Among Older Male Inmates	USA	Quantitative	50
Al-Rousan et al. (2017)	Inside the nation's largest mental health institution: a prevalence study in a state prison system	USA	Quantitative	50
Arndt et al. (2002)	Older offenders, substance abuse, and treatment	USA	Quantitative	55
Baidawi (2016)	Older prisoners: psychological distress and associations with mental health history, cognitive functioning, socio-demographic, and criminal justice factors	Australia	Quantitative	45 and 50
Baidawi and Trotter (2016)	Psychological distress among older prisoners: Associations with health, health care utilization, and the prison environment	Australia	Quantitative	45 and 50
Baidawi et al. (2016a)	Prison Experiences and Psychological Distress among Older Inmates	Australia	Quantitative	45 and 50
Baidawi et al. (2016b)	An integrated exploration of factors associated with psychological distress among older prisoners	Australia	Quantitative	45 and 50
Barak et al. (1995)	Elderly criminals: A study of the first criminal offense in old age	Israel	Quantitative	65
Barry et al. (2014)	Comorbid mental illness and poor physical function among newly admitted inmates in Connecticut's jails	USA	Quantitative	40
Barry et al. (2016a)	Active and passive suicidal ideation in older prisoners	USA	Quantitative	50

Barry et al. (2016b)	Disability in prison activities of daily living and likelihood of depression and suicidal ideation in older prisoners	USA	Quantitative	50
Beaufrère and Chariot (2015)	The health of older arrestees in police cells	France	Quantitative	60
Bishop and Merten (2011)	Risk of comorbid health impairment among older male inmates	USA	Quantitative	45
Bishop et al. (2014)	Consideration of Forgiveness to Enhance the Health Status of Older Male Prisoners Confronting Spiritual, Social, or Emotional Vulnerability	USA	Quantitative	45
Bolano et al. (2016)	Detained and Distressed: Persistent Distressing Symptoms in a Population of Older Jail Inmates	USA	Quantitative	55
Caverley (2006)	Older mentally ill inmates: A descriptive study	USA	Quantitative	50
Coid et al. (2002)	Elderly patients admitted to secure forensic psychiatry services	UK/Ireland	Quantitative	60
Colsher et al. (1992)	Health Status of Older Male Prisoners: A Comprehensive Survey	USA	Quantitative	50 and 60
Combalbert et al. (2017)	Cognitive impairment, self-perceived health and quality of life of older prisoners	France	Quantitative	50
Combalbert et al. (2016)	Mental disorders and cognitive impairment in ageing offenders	France	Quantitative	50
Condon et al. (2008)	Choosing health in prison: prisoners' views on making healthy choices in English prisons	UK/Ireland	Qualitative	60
Courtney and Maschi (2013)	Trauma and stress among older adults in prison: Breaking the cycle of silence	USA	Quantitative	50
Crawley and Sparks (2005)	Hidden Injuries? Researching the Experiences of Older Men in English Prisons	UK/Ireland	Qualitative	65
Crawley and Sparks (2006)	Is there life after imprisonment?: How elderly men talk about imprisonment and release	UK/Ireland	Quantitative	65
Curtice et al. (2003)	The elderly offender: An 11-year survey of referrals to a regional forensic psychiatric service	UK/Ireland	Quantitative	65
Davoren et al. (2015)	Older men and older women remand prisoners: Mental illness, physical illness, offending patterns and needs	UK/Ireland	Quantitative	60

de Guzman et al. (2017)	As pliant as the bamboo: A grounded theory study of incarcerated Filipino elderly people's sense of resiliency	Phillipines	Qualitative	60
de Guzman et al. (2012)	For your eyes only: A Q-methodology on the ontology of happiness among chronically ill Filipino elderly in a penal institution	Phillipines	Mixed Methods	55
De Smet et al. (2017)	Factors related to the quality of life of older prisoners	Belgium	Quantitative	60
Deaton et al. (2009)	The Effect of Health and Penal Harm on Aging Female Prisoners' Views of Dying in Prison	USA	Mixed Methods	50
Falter (1999)	Selected Predictors of Health Services Needs of Inmates Over Age 50	USA	Quantitative	50
Fazel and Grann (2002)	Older criminals: A descriptive study of psychiatrically examined offenders in Sweden	Sweden	Quantitative	60 and 65
Fazel et al. (2001a)	Hidden psychiatric morbidity in elderly prisoners	UK/Ireland	Quantitative	60
Fazel et al. (2002)	Psychiatric, demographic and personality characteristics of elderly sex offenders	UK/Ireland	Quantitative	60
Fazel et al. (2004)	Unmet treatment needs of older prisoners: a primary care survey	UK/Ireland	Quantitative	60
Fazel et al. (2001b)	Health of elderly male prisoners: worse than the general population, worse than younger prisoners	UK/Ireland	Quantitative	60
Flatt et al. (2017)	Post-traumatic stress disorder symptoms and associated health and social vulnerabilities in older jail inmates	USA	Quantitative	55
Gates et al. (2017)	Substance Use Disorders and Related Health Problems in an Aging Offender Population	USA	Quantitative	45
Handtke and Wangmo (2014)	Ageing prisoners' views on death and dying: Contemplating end-of-life in prison	Switzerland	Qualitative	50
Handtke et al. (2015)	Easily forgotten: Elderly female prisoners	Switzerland	Mixed Methods	50
Handtke et al. (2017)	New guidance for an old problem: Early release for seriously ill and elderly prisoners in Europe	Switzerland	Qualitative	50
Harzke et al. (2010)	Prevalence of chronic medical conditions among inmates in the Texas prison system	USA	Quantitative	all age groups

Haugebrook et al. (2010)	Trauma, stress, health, and mental health issues among ethnically diverse older adult prisoners	USA	Quantitative	55
Hayes et al. (2012)	The health and social needs of older male prisoners	UK/Ireland	Quantitative	50 and 60
Heidari et al. (2017)	Accessibility of prison healthcare for elderly inmates, a qualitative assessment	Switzerland	Qualitative	50
Iftene (2016)	Unlocking the doors to Canadian older inmate mental health data: Rates and potential legal responses	Canada	Quantitative	50
Jordan (2013)	Health literacy: Advance directives among the African American aging prisoner population	USA	Quantitative	50
Kerber et al. (2012)	Gambling behaviors and perceived health among incarcerated older adults	USA	Quantitative	50
Kingston et al. (2011)	Psychiatric morbidity in older prisoners: Unrecognized and undertreated	UK/Ireland	Quantitative	50
Kratcoski and Babb (1990)	Adjustment of Older Inmates: An Analysis of Institutional Structure and Gender	USA	Mixed Methods	50
Leigey and Hodge (2012)	Gray Matters: Gender Differences in the Physical and Mental Health of Older Inmates	USA	Quantitative	50
Leigey and Johnston (2015)	The prevalence of overweight and obesity among aging female inmates	USA	Quantitative	50
Lewis et al. (2006)	A Study of geriatric forensic evaluees: Who are the violent elderly?	USA	Quantitative	60
Lightbody et al. (2010)	A survey of older adult patients in special secure psychiatric care in Scotland from 1998 to 2007	UK/Ireland	Quantitative	55
Loeb and Steffensmeier (2006)	Older Male Prisoners: Health Status, Self-Efficacy Beliefs, and Health-Promoting Behaviors	USA	Quantitative	50
Loeb and Steffensmeier (2011)	Older Inmates' Pursuit of Good Health A Focus Group Study	USA	Qualitative	50
Loeb et al. (2011)	Predictors of self-efficacy and self-rated health for older male inmates	USA	Quantitative	50
Loeb et al. (2008)	Comparing incarcerated and community-dwelling older men's health	USA	Quantitative	50
Loeb et al. (2007)	In their own words: older male prisoners' health beliefs and concerns for the future	USA	Qualitative	50

Marquart et al. (2000)	The health-related concerns of older prisoners: Implications for policy	USA	Mixed Methods	50
Maschi et al. (2011a)	Trauma and life event stressors among young and older adult prisoners	USA	Quantitative	55
Maschi et al. (2011b)	Age, Cumulative Trauma and Stressful Life Events, and Post-traumatic Stress Symptoms Among Older Adults in Prison: Do Subjective Impressions Matter?	USA	Quantitative	55
Maschi et al. (2015)	Trauma, stress, grief, loss, and separation among older adults in prison: the protective role of coping resources on physical and mental well-being	USA	Quantitative	50
McGrath (2002)	Oral health behind bars: a study of oral disease and its impact on the life quality of an older prison population	Hongkong	Quantitative	60
McLeod et al. (2008)	Referrals of older adults to forensic and psychiatric intensive care services: A retrospective case-note study in Scotland	UK/Ireland	Quantitative	55
Merten et al. (2012)	Prisoner Health and Valuation of Life, Loneliness, and Depressed Mood	USA	Quantitative	45 and 55
Murdoch et al. (2008)	Depression in elderly life sentence prisoners	UK/Ireland	Quantitative	55
Nowotny et al. (2016)	Growing Old Behind Bars: Health Profiles of the Older Male Inmate Population in the United States	USA	Quantitative	50
O'Hara et al. (2016)	Links between depressive symptoms and unmet health and social care needs among older prisoners	UK/Ireland	Quantitative	60
Paradis et al. (2000)	Mentally Ill Elderly Jail Detainees Psychiatric, Psychosocial and Legal Factors	USA	Quantitative	62
Phillips et al. (2011)	Aging Prisoners' Treatment Selection: Does Prospect Theory Enhance Understanding of End-of-Life Medical Decisions?	USA	Quantitative	45
Phillips et al. (2009)	Care alternatives in prison systems: Factors influencing end-of-life treatment selection	USA	Quantitative	50
Rayel (2000a)	Clinical and Demographic Characteristics of Elderly Offenders at a Maximum-Security Forensic Hospital	Canada	Quantitative	55
Rayel (2000b)	Elderly Sexual Offenders Admitted to a Maximum-Security Forensic Hospital	Canada	Quantitative	55

Regan et al. (2002)	Psychiatric disorders in aging prisoners	USA	Quantitative	55
Rodriguez et al. (2017)	A neuropsychological study of older adult first-time sex offenders	Australia	Quantitative	50
Rosner et al. (1985)	Geriatric Felons Examined at a Forensic Psychiatry Clinic	USA	Quantitative	62
Rosner et al. (1991)	Geriatric Offenders Examined at a Forensic Psychiatry Clinic	USA	Quantitative	62
Shah (2006)	An audit of a specialist old age psychiatry liaison service to a medium and a high secure forensic psychiatry unit	UK/Ireland	Quantitative	60
Sodhi-Berry et al. (2015)	Pre- and post-sentence mental health service use by a population cohort of older offenders (>=45 years) in Western Australia	Australia	Quantitative	45
Stoliker and Varanese (2017)	Spending the Golden Years Behind Bars: Predictors of Mental Health Issues Among Geriatric Prisoners	USA	Quantitative	50
Sullivan et al. (2016)	‘You can't have them in here’: experiences of accessing medication among older men on entry to prison	UK/Ireland	Qualitative	60
Taylor and Parrott (1988)	Elderly offenders: A study of age-related factors among custodially remanded prisoners	UK/Ireland	Quantitative	all age groups
Trotter and Baidawi (2015)	Older prisoners: Challenges for inmates and prison management	Australia	Mixed Methods	50
Wangmo et al. (2015)	Ageing prisoners' disease burden: is being old a better predictor than time served in prison?	Switzerland	Quantitative	50
Wangmo et al. (2016)	Aging Prisoners in Switzerland: An Analysis of Health Care Utilization	Switzerland	Quantitative	50
Washington Patricia (1989)	Mature Mentaly Ill Offenders in California Jails	USA	Quantitative	50
Wilkinson and Caulfield (2017)	The Perceived Benefits of an Arts Project for Health and Wellbeing of Older Offenders	UK/Ireland	Qualitative	50
Williams et al. (2014)	Pain Behind Bars: The Epidemiology of Pain in Older Jail Inmates in a County Jail	USA	Quantitative	55
Williams et al. (2010a)	Medication Prescribing Practices for Older Prisoners in the Texas Prison System	USA	Quantitative	55

Williams et al. (2006)	Being Old and Doing Time: Functional Impairment and Adverse Experiences of Geriatric Female Prisoners	USA	Quantitative	55
Williams et al. (2010b)	Coming home: Health status and homelessness risk of older pre-release prisoners	USA	Quantitative	55
Wilson and Vito (1986)	Imprisoned Elders: The Experience of One Institution	USA	Mixed Methods	50
Wong et al. (1995)	Elderly offenders in a maximum security mental hospital	UK/Ireland	Quantitative	50
Yorston and Taylor (2009)	Older patients in an English high security hospital: A qualitative study of the experiences and attitudes of patients aged 60 and over and their care staff in Broadmoor Hospital	UK/Ireland	Qualitative	60
Zgoba et al. (2012)	An exploration into the intersections of early and late sexual victimization and mental and physical health among an incarcerated sample of older male offenders	USA	Quantitative	50

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