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Review



Resilience in older persons: A systematic review of the conceptual literature

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ABSTRACT

Although ageing research increasingly incorporates resilience, a common notion on what resilience means is lacking. We aimed to give a comprehensive overview of the conceptual literature on resilience in older persons, identifying areas of consensus and variation/debate. A systematic search of eight databases from different disciplines led to the inclusion of 36 texts.

Across the conceptual literature of resilience in older persons, three common features of descriptions of resilience were identified: a stressor, a response and a mechanism. Based on differences in their interpretation of how resilience is expressed we distinguished two perspectives. The first, classical and most widely applied perspective, describes the expression of resilience as a positive response to a high intensity stressor. The second, newer perspective, describes resilience in the context of responses relative to equilibrium, following low intensity stressors. Almost all descriptions across the two perspectives describe the resilience mechanism to be dynamic and emphasize the importance of the context in achieving resilience.

This review provides clarity on the current conceptual status of resilience in older persons, an important step towards a higher level of consistency in the future use of resilience in ageing.

1. Introduction

Traditionally, ageing was seen as a negative process, leading to loss on different domains (social, physical and cognitive). In the 1980's a paradigm shift within gerontology led to a more positive outlook on ageing, with, for example, a focus on studying those who age "successfully" (Harris, 2008). Many successful ageing definitions incorporate the complete avoidance of loss, disease and/or adversity (Pruchno et al., 2015). However, for most older persons the reality of ageing includes adversities such as illness, disability, loneliness, and cognitive impairment. At the core of resilience is "some form of adversity and a positive response to this adversity" (Cosco et al., 2017a). In contrast to the traditional successful ageing construct, resilience in ageing therefore allows us to study dealing with, or doing well despite adversities; a goal that can be achieved regardless of the circumstances (Pruchno and Carr, 2017). It is therefore considered a positive and more generally

applicable construct that does justice to the reality of ageing: a complex process with a mix of gains and losses (Cosco et al., 2017a; Gattuso, 2003; Harris, 2008; Smith et al., 2012).

Etymologically, the term resilience derives from the Latin verb *resilire*: meaning "to jump back" or "to recoil" (Merriam-Webster, 2019). It was first used within the physical sciences in the 1800's to describe "the capability of a strained body to recover its size and shape after deformation caused especially by compressive stress" (Merriam-Webster, 2019; Whitson et al., 2016). Since then, the term resilience has been used within a large variety of scientific fields including engineering (e.g. the resilience of bridges; Qeshta et al., 2019) and ecology (i.e. the resilience of ecosystems; Scheffer et al., 2009). In human research, resilience has its roots in developmental psychology, where researchers noticed that many children did not develop psychological pathology in the face of pronounced, often chronic adversities such as poverty and abuse (Garmezy, 1974; Masten, 1989; Rutter, 1979; Werner and Smith,

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1982). Increasing interest in resilience within the psychological domain has led to a robust body of literature on this subject in different age groups, including older persons. In 2016, *physical* resilience in older persons was put forward as an emerging construct in ageing (Whitson et al., 2016). Thus, resilience is posited as emerging and potentially valuable within different domains of ageing research. Exploring resilience is thought to result in insights in opportunities to improve well-being in older age, despite the associated adversities (Cosco et al., 2017a). A better understanding of resilience may help to identify protective factors and facilitate the development of intervention strategies, both at an individual and a public health level (Cosco et al., 2017a; Whitson et al., 2016).

However, in order to work with resilience, there must be a certain level of agreement on what it means. Empirical literature has described and operationalised resilience in many different ways (Cosco et al., 2017a, b; van Kessel, 2013). However, the scientific use of resilience has been criticized because of a lack of conceptual and operational clarity, both in general (Luthar et al., 2000; van Kessel, 2013) and specifically in older persons (Allen et al., 2011; van Kessel, 2013).

Earlier reviews on resilience in older adults have focused on empirical research, describing resilience scales, prevalence of resilience and the factors that play a role in reaching resilience (MacLeod et al., 2016; van Kessel, 2013). Two comprehensive reviews have described resilience from a more conceptual angle within specific domains such as psychological resilience across the lifetime (Windle, 2011), and physical resilience in older persons (Whitson et al., 2016). A recent comprehensive review of operationalisations of resilience in older adults, however, has re-stressed the need for a clear overall conceptual framework for resilience as a first step towards appropriate operationalization and application of resilience (Cosco et al., 2019). With increasing interest in resilience in ageing across different domains, a current and comprehensive overview of the conceptual literature of resilience in older persons across domains is warranted. The question remains: What constitutes resilience in older persons exactly? Can all descriptions of resilience in the literature be understood as similar interpretations of resilience, but with different emphases? Or are the descriptions of resilience fundamentally different?

Our main aim is therefore to give a systematic and comprehensive overview of the conceptual literature on resilience in older persons across domains. Areas of consensus and areas of variation/debate within the literature will be identified.

2. Methods

The protocol of this systematic review was developed in line with the PRISMA checklist for systematic reviews (Moher et al., 2009) and registered on PROSPERO (CRD42019105185) (Angevaere et al., 2019).

2.1. Search procedure

Database searches from different scientific domains were performed together with a medical librarian (*LS*). Search terms included controlled terms as well as free text terms. In each database the following terms were searched (including synonyms and closely related words), as index terms or free-text words: 'resilience' and 'older persons' and 'concept (ualisation)' or 'models'. The full search strategy for PubMed is presented in Supplementary Box 1. In order to include articles from the theology and philosophy domains ATLA and Philosopher's index were searched, but without relevant results. Within medical, psychological and social science domains, the databases PubMed, EMBASE, CINAHL (Ebsco), PsycINFO (Ebsco), SCOPUS, and IBSS (Proquest) were searched on 20–8-2018. The search was performed without date or language restrictions. Duplicate articles were excluded.

2.2. Selection procedure

2.2.1. Title-abstract screening

First, titles and abstracts were evaluated for possible relevance. This occurred in two rounds. In the first round, they were evaluated based solely on the exclusion criteria (Box 1) by a single investigator (*MA*), as these were very straightforward to judge. Subsequently, in a second round, two investigators (*MA*, *JR*) independently evaluated the title-abstracts of the texts that were not excluded in round 1, based on the inclusion criteria (Box 1). Discrepancies were discussed to come to a consensus for all abstracts.

All chapters in the books that were encountered in the search (through, for example, inclusion of a chapter abstract, or abstract of a book review) were assessed for their relevance. Abstracts/ first paragraphs of possibly relevant chapters were screened based on inclusion and exclusion criteria. Full texts of relevant chapters were, subsequently, included in the full text screening.

2.2.2. Full text screening

First, a single investigator (*MA*) evaluated the relevance of the full text, based on the inclusion and exclusion criteria. Those cases in which full text in-/exclusion was immediately clear (e.g. because an earlier concept was applied without being adapted), led to direct in- or exclusion. A verification of these exclusions was carried out independently by a second reviewer (*JR*) in a random sample of approximately 10 %. There was complete consensus on these exclusions. All other texts were screened independently by two reviewers (*MA*, *JR*).

Because of the great amount of variation in terminology (concept, conceptualisation, model, framework, etc) used in the literature we decided to use the overall term "description" when speaking of the description each text gives of resilience in older persons, irrespective of the term used by the authors themselves.

An extra step was undertaken to systematically evaluate the last inclusion criterion, which requires the text "to describe any new aspect of a description of resilience in older persons". For those full texts that appeared to meet the inclusion criteria the new "aspects" introduced by the full texts were listed by reviewer *MA*. Subsequently, all texts were assessed chronologically and those texts that described an aspect that had not been described in the earlier texts were included (see column "new aspects" in Supplementary Table 1). This was discussed with a second reviewer (*JR*). Discrepancies were discussed in order to come to a consensus. In case of continuing disagreement or uncertainty a third reviewer decided on in-/ exclusion (*MS*). The reference lists of all full-texts from the original search included in the review were checked.

2.2.2.1. Identification of "general" resilience descriptions not specifically developed for older adults. During screening, we noticed that several full texts applied an existing "general" (i.e. not geared specifically to older persons) description of resilience to older persons, without adapting it. The full texts in which these general resilience descriptions were first presented were not identified within the database search, as 'older persons' was included as one of the search terms. In this case, the full text originally positing the "general" resilience description was included in all the steps below, and the text applying it to older persons was excluded. In those cases that an article found in the search adapted an existing description to older persons this article was included, as we considered this as including a new aspect of resilience.

2.3. Data extraction

Data extraction of included texts was done by one reviewer (*MA*) and checked by a second reviewer (*JR*, *MS*, *HH*, *KJ*, *CH*). All data, both textual and graphical, regarding the description of resilience from each text was extracted. This data was compiled in a summary of each description by a reviewer (*MA*), presented in Supplementary Tables 1a

Box 1

Selection criteria.

Exclusion criteria:

- a Text not in the English language
- b Subject of text other than humans (computer, animals, etc)
- c Text on a cellular/molecular level
- d Subject of text clearly not older persons (children, workforce, etc)

Inclusion criteria:

- a Subject of text older persons (described as older/ elderly/aged or if these terms are not used: ages of all persons ≥ 65)
- b Resilience is the main topic of the text
- c Inclusion of a new (aspect of a) description of individual, person-level resilience, further specified as:
 - a A description of resilience at the level of a person as a whole (not family/couple/specific parameter/organ level).
 - b A description of different components and their relation to each other, i.e. not solely resilience factors or a resilience scale/measurement tool.
 - c A description can also be developed in other populations, but adapted for use in older persons.

Terms that might be used to describe this description are: concept, construct, theory, framework, model

and 1b. These summaries were checked by a second reviewer (JR).

2.4. Analysis

The steps above led to the inclusion of full texts with (a new aspect of) a description of resilience in older persons, and full texts of descriptions of resilience that were later applied in older persons. The similarities and differences between all included descriptions were charted (MA). A consensus on a meaningful categorization of the descriptions was reached after discussion meetings with JR, MS, HH, KJ, GW, CH.

3. Results

3.1. Search & selection

The search led to 6062 abstracts after removal of duplicates (see Fig. 1: Flow chart).

A total of 177 texts were screened full text, leading to the inclusion of 37 descriptions from the original search and 2 “general” resilience descriptions that were later applied in older persons. These texts were published between 1990 and 2018 (30 since 2010), consisting of 31 articles and 8 book chapters.

3.2. Common features and perspectives of resilience

All 39 descriptions of resilience are described in Appendix: Supplementary Tables 1a and b.

The descriptions contain three common features. We therefore conclude that a description of resilience encompasses these essential features:

1 The presence of a **stressor**.

The term stressor, rather than adversity, was chosen here as it better encompasses the full breadth of the included literature. The interpretation of what the stressor entails, such as the required intensity, differs between descriptions.

2 A **response** to the stressor, which is judged as relatively good or positive.

There is, however, a great amount of variation in what is judged to be relatively good or positive, and how this response is captured.

3 The **mechanism** by which this response is achieved, including the factors that play a role in achieving it.

The stressor and the response are included in the descriptions as they are essential to the expression and assessment of resilience. The positive response is the expression of resilience, which can only occur in the face of the stressor. The mechanism explains how the person achieves a good outcome (O’Cathain et al., 2019), it is the resilience itself. In other words, that which occurs between the stressor and resilience outcome (response).

The descriptions vary in the exact interpretation of these three features, the relationship between the features, and the emphasis that is placed on the different features.

Based on different interpretations of how resilience is expressed through the stressor and response, we distinguished two perspectives on resilience. The first, classical and most widely applied perspective, describes a resilient response as a (more) positive (than expected) response to a high intensity stressor. The second, newer and less frequently applied perspective, describes resilience in the context of responses over time relative to equilibrium, following (frequently occurring) low intensity stressors. Resilience in this perspective is described in mathematically modelled patterns of change over time, relative to equilibrium. The two perspectives do not differ greatly with regard to the feature ‘mechanism’. However, this feature is generally more extensively described within the more widely applied perspective 1. The following section will elaborate on the similarities within, and differences between, the two perspectives.

Perspective 1. Resilience as a (more) positive response than expected in relation to a high intensity stressor

Perspective 1 represents the largest bodied and longest-standing (texts published since 1990) tradition of resilience in older persons. Thirty-six of the descriptions approach resilience from perspective 1. This perspective has strong roots in developmental psychology, as described in the introduction.

The intensity of the described stressor differs between the descriptions. However, the vast majority describe a high intensity, particularly challenging, consciously experienced and readily

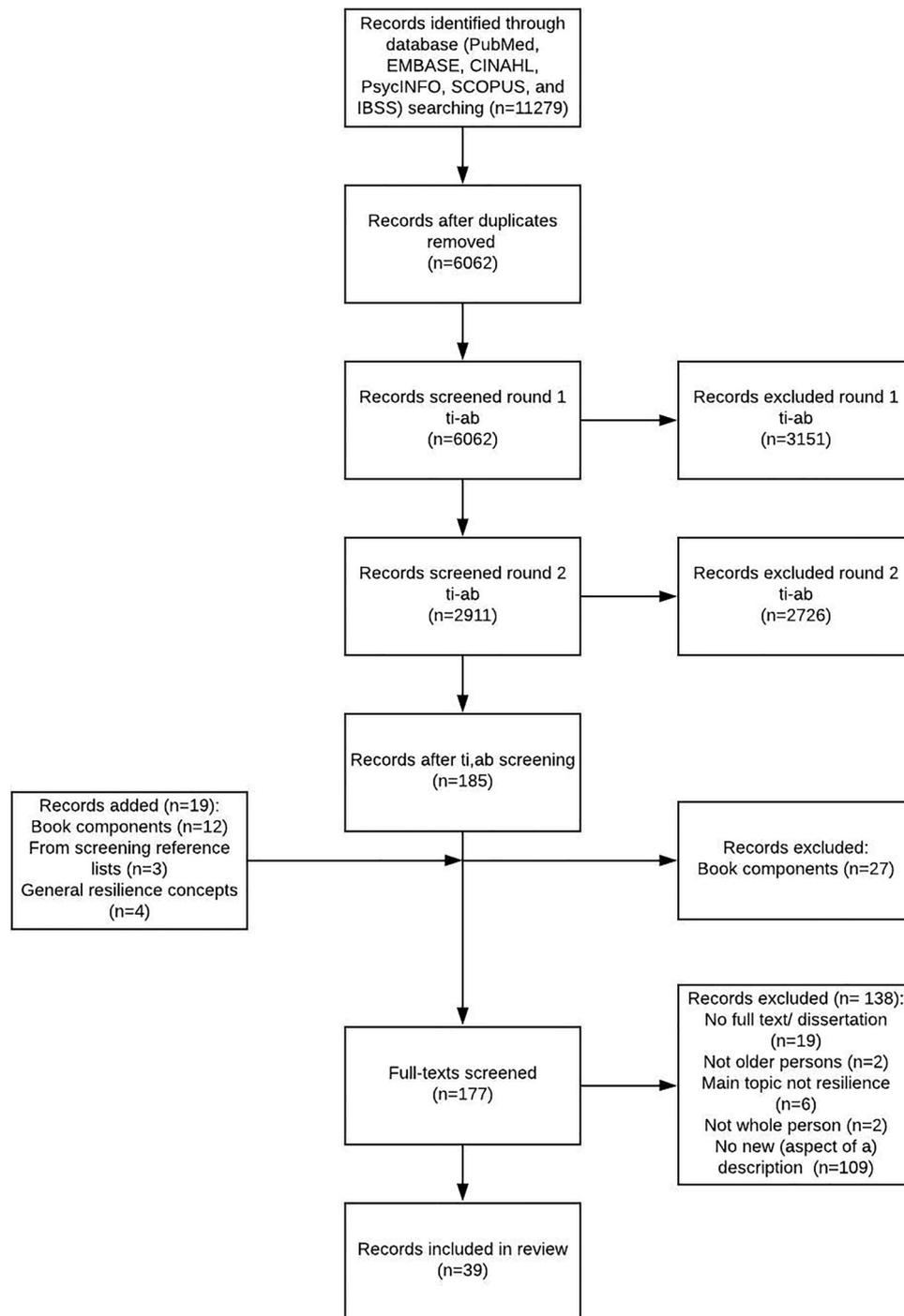


Fig. 1. Flow chart text selection.

perceptible stressor. Examples of this are devastating/chronic illness or loss (Felten and Hall, 2001; Fortinsky et al., 2013). A description of the (course of the) response which the authors consider relatively positive and relevant in the context of this particular stressor is provided. The response within these descriptions takes place over longer time periods. For example, resilience is characterized as an, at least partially subjective, improvement in functioning in one of three domains, in response to a challenge: physical, psychological or social functioning (Hochhalter et al., 2011). The features stressor and response are not isolated entities within these descriptions: they are described in relation to each other, the individual experiencing/expressing them, and the context in which they are experienced.

Perspective 2. Resilience in the context of responses over time relative to equilibrium, following (frequently occurring) low intensity stressors

The second perspective is relatively new; three of the descriptions included in this review approach resilience from this perspective (see Supplementary Table 1b). The first of these descriptions was published in 2008.

Within this perspective, a person’s resilience can be studied by monitoring their real-time reaction to (a) low intensity stressor(s). This perspective emphasizes the dynamic aspect of resilience, namely changes over time, rather than describing the level of a response at discreet time points (Montpetit et al., 2010). Dynamical systems models

are employed to mathematically model this change over time, relative to an equilibrium (Boker and Toni, 2006; Montpetit et al., 2010). Specific patterns in the responses to stressors over time are considered to represent resilience. These responses can subsequently function as prospective indicators of resilience of the individual to higher intensity stressors (Gijzel et al., 2019).

In the next section, variations within the two perspectives will be elaborated on, per feature.

3.3. Variations between descriptions per feature

3.3.1. Stressor

3.3.1.1. Perspective 1. Different terms such as adversity, challenge, risk (factor), unfavourable conditions, and threat are also used to describe the stressor (Greve et al., 2006; Windle, 2011).

Most descriptions characterize these stressors as relatively negative and of a high intensity. For instance, two descriptions in older persons include the following criteria: “physical, psychosocial, cognitive life experiences that are negative and entail challenges of coping/adaptation” (Hicks and Conner, 2013); and “stressors should lead to a negative outcome under normal circumstances with a majority of people” (Windle, 2011). The other descriptions do not provide criteria, but describe many different specific circumstances that can be interpreted as particularly challenging, such as (devastating) illness or loss (Bennett, 2010; Felten and Hall, 2001; Fortinsky et al., 2013; Halkitis et al., 2017). For a complete overview of stressors, see Supplementary Table 2. In contrast with this commonality of high intensity stressors, four descriptions (Grandbois and Sanders, 2009; Janssen et al., 2011; Shaw et al., 2014; Whitson et al., 2016) incorporate the (possibility) of lower intensity, more ambivalent stressors, such as challenges in daily life or normal ageing (Grandbois and Sanders, 2009; Janssen et al., 2011).

Another notable commonality is that most of the stressors described in old age are relatively chronic. Chronic stressors, such as disablement, cognitive impairment and caregiving, are understood to be inherent to old age (Hayman et al., 2017; Richardson et al., 2014). However, more acute events are also represented in the descriptions in this population, for example by stressors such as trauma (Bauer et al., 2010).

Importantly, the stressor does not occur in isolation, but must be interpreted within the context in which it takes place. Firstly, this is portrayed by the fact that several descriptions emphasize the significance of the effect of an accumulation of stressors on the response (Bennett et al., 2016; Pruchno et al., 2015; Richardson, 2002; Ryff et al., 1998). This is of particular importance in older persons who have had a long period of time to experience stressors. Additionally, there is an abundance of potential stressors in old age itself (Aldwin and Igarashi, 2012; Nelson-Becker and Becvar, 2013; Pruchno et al., 2015; Ryff et al., 1998). Secondly, the significance attached to the stressor by the individual experiencing it is thought to play a role in its effect (Cárdenas and López, 2010; Hayman et al., 2017; Richardson et al., 2014; Windle, 2011). One description even posits that a possibly positive event (such as a job change) can function as a stressor when “it entails a change in the individual’s world paradigm necessitating reintegration” (Richardson, 2002). From a life course perspective, the generation, cohort or the time and place a person grows up in, not only influences the stressors they are confronted with, but also how these stressors are appraised (Nelson-Becker and Becvar, 2013; Pruchno et al., 2015).

3.3.1.2. Perspective 2. As described, stressors within this perspective are of a low intensity. One description within this perspective argues that studying a person under basal conditions does not capture the dynamic responses of that person. Therefore, resilience can best be observed in response to an experimentally-induced external stimulus (stressor). This stimulus, the stressor within this description could be, for example, the administering of a hormone (e.g. a dexamethason

suppression test), or exercise (e.g. an exercise echocardiographic test; Varadhan et al., 2008).

However, experimental set-ups are not always feasible or ethical. The other two descriptions within this perspective incorporate naturally occurring day-to-day stressors: these are termed ‘natural perturbations’ or ‘daily hassles/ typical stressful life circumstances’ (Gijzel et al., 2017; Montpetit et al., 2010). The assumption within these descriptions is that a person, especially an older person, is constantly subject to natural low-intensity stressors from the environment (Gijzel et al., 2017; Montpetit et al., 2010). These stressors provide natural circumstances in which adaptation can be studied by monitoring the response to these stressors over time, without requiring the monitoring of the stressors themselves (Gijzel et al., 2017; Montpetit et al., 2010). For example, experienced stress and affect may be monitored on a daily basis, capturing the effect of undefined natural stressors without requiring monitoring of these stressors themselves (Montpetit et al., 2010). Any and all stressors and the context in which they occur are therefore included through their effect on the response. The specific stressors that may play a role depend on the domain of the response of interest. For example, when describing resilience in postural balance, these stressors can be body sway caused by physiological functions, such as breathing; and environmental factors, such as a breeze (Gijzel et al., 2018). These natural perturbation-type stressors are therefore implicit, undefined by the description and are not necessarily consciously experienced by the person (Montpetit et al., 2010).

3.3.2. Response

In both perspectives, the response that is described to be resilient is closely related to the author’s description of the stressor.

3.3.2.1. Perspective 1. As described, the roots of this perspective lay in developmental psychology. However, the domains of the response range from development and wellbeing to physical health or functioning. All domains of responses within the various descriptions are portrayed in Supplementary Table 3a.

Several descriptions specifically explain the resilient response to fall within one specific domain, or one of several possible domains, emphasizing that a resilient response is not required to be all-encompassing (Hochhalter et al., 2011; Pruchno et al., 2015; Wild et al., 2013). In contrast, one description includes a resilience index which combines positive adaptation across the functional, social and psychological domains (Wister et al., 2018).

In many descriptions, a course of the response over time after, or while experiencing the stressor, is described also. All courses of the resilient response, described by the various descriptions, can be categorized into five main types, as portrayed in Supplementary Table 3b.

The large amount of variation between these five main types of resilient courses is graphically depicted in Fig. 2. While these five types of courses are all described to be resilient by at least one of the descriptions, they are not all endorsed by all descriptions. The complete avoidance of a stressor is incorporated as a resilient response in one description (Rosowsky, 2011), but others describe the experience of a stressor as essential to the resilient response, arguing against this interpretation (Pathike et al., 2017; Pruchno et al., 2015; Ryff et al., 1998).

The four other courses are each described by several texts: 1. avoidance of a reaction or maintenance of a level (of functioning, for example); 2. (return to) a lower level / loss management; 3. return to earlier level; and 4. reaching a higher level than prior to the stressor / growth. Returning to a specific level following an initial (deeper) decline is often termed “bouncing back”. Some descriptions specifically describe a resilient response in older persons to entail growth (Hochhalter et al., 2011; Pruchno et al., 2015). Other authors suggest that maintenance and loss management (a lower level) may be more appropriate in the context of the chronic stressors which are particularly relevant in old age

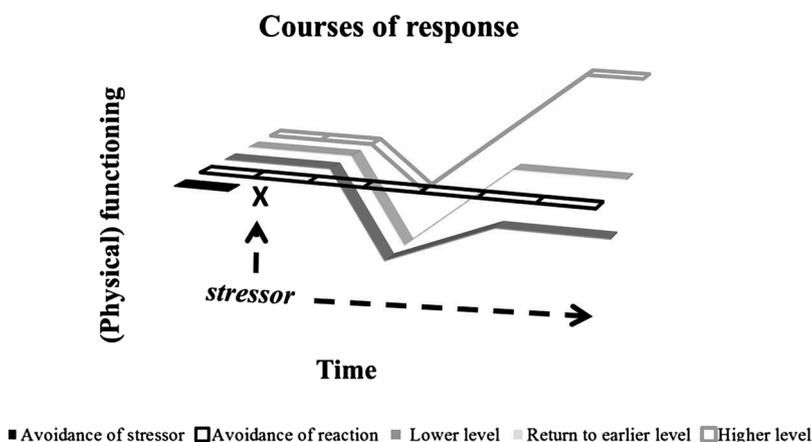


Fig. 2. The five main types of courses of the resilient response. This graph depicts examples of the five different courses that are described to be resilient by the different descriptions. As an example, these courses are illustrated within the domain of physical functioning. The return to lower level and growth courses are depicted here as progression following an initial (deeper) decline, however not all authors explicitly describe what occurs between the occurrence of the stressor and the final stable state.

(Hayman et al., 2017; Richardson et al., 2014; Wister et al., 2018). Many descriptions include several of these possible courses.

Like the stressor, the response is often not described in isolation. The context, and in particular the person experiencing this response, is considered in several descriptions (Hochhalter et al., 2011; Wild et al., 2013; Williamson and Paslawski, 2016). Several authors argue that asking older persons what they judge to be a positive response leads to more informative results than when researchers determine what the resilient response should be.

On a different level, descriptions differ on how the emotional experience of a person should be incorporated into a researcher-defined resilient response. While within some descriptions a person's response can be considered resilient despite the subjective experience of negative affect or (di)stress (Nelson-Becker and Becvar, 2013; Richardson, 2002; Windle, 2011), others specifically describe a resilient response to preclude (di)stress (Bennett et al., 2016; Donnellan et al., 2015).

3.3.2.2. Perspective 2. As described, within this perspective the course of response to (a) relatively small experimental or natural stressor(s) over time is thought to be indicative of the person's overall capacity for resilience. The courses of the resilience response, based on dynamical systems models, play a dominant role in the descriptions within this perspective.

The descriptions apply different specific dynamical systems models when modelling the resilient response (Gijzel et al., 2017; Montpetit et al., 2010). However, two general categories of resilient responses can be distinguished across the different models. The first category is based on the fluctuations (or disruptions relative to equilibrium) of a single domain as represented by a single parameter and includes two types of resilient responses. Firstly, a low amount of disruption (as described by low variance) over time is considered indicative of resilience. For example, the daily self-reported physical health will fluctuate less within a resilient response than in a response that is not resilient (Gijzel et al., 2017). The second type of resilient response based on a single parameter, is a quicker recovery or shorter time to return to equilibrium/homeostasis following disruptions (Gijzel et al., 2017; Montpetit et al., 2010; Varadhan et al., 2008). This is also called a "high level of damping" (Montpetit et al., 2010). For example, recovery from a disruption in physical health (Gijzel et al., 2017) or in hormone concentration (Varadhan et al., 2008) will occur more quickly within a resilient response.

The second category of resilient responses is based on the modelling of two domains relative to each other. A response is characterized as resilient when a disruption in one domain does not lead to disruptions in (an)other domain(s). This is also described as a "low level of coupling" (Gijzel et al., 2017; Montpetit et al., 2010). For example, when resilient individuals experience a disruption in their physical health, this does not necessarily lead to a coupled disruption in mental health (Gijzel et al.,

2017).

The examples described here demonstrate that, as in perspective 1, there is great variety in possible domains of the response. The specific domain described also determines the length of the time series of the response measurement. For example, this would be seconds in the case of balance parameters (Gijzel et al., 2018), days in the case of immune reaction to vaccination (Varadhan et al., 2008) and months in the case of daily self-reported health, affect or stress (Gijzel et al., 2017; Montpetit et al., 2010). Describing the response over an appropriate time interval is therefore essential to these descriptions (Gijzel et al., 2017; Varadhan et al., 2008).

3.3.3. Mechanism

As mentioned, the feature mechanism describes how the resilient response is achieved in light of the stressor, in other words it is the resilience itself.

3.3.3.1. Perspective 1. The first description of resilience in older persons, written in 1990, characterizes resilience as emotional stamina, and an innate, individual trait (Wagnild and Young, 1990). Although one other description characterizes resilience as a personality characteristic (Fortinsky et al., 2013), all others describe resilience as being dynamic, influenced by both time and context. Most authors used the term process (Cárdenas and López, 2010; Foster, 1997; Janssen et al., 2011; Windle, 2011) to describe resilience. Other authors used terms such as capacity or ability, or allowed for the use of different terms in different situations to describe resilience, while still incorporating the variability of resilience across time and contexts (Aldwin and Igarashi, 2012; Felten and Hall, 2001; Halkitis et al., 2017; Nelson-Becker and Becvar, 2013; Ryff et al., 1998; Whitson et al., 2016).

The commonality of resilience is stressed often in the different descriptions. While resilience was originally seen as something extraordinary within developmental psychology, many descriptions of resilience in older persons describe resilience as something common or something which can be achieved by (almost) everyone (Greve et al., 2006; Richardson, 2002; Windle, 2011).

All descriptions have an interest in the factors that play a role within the mechanism of resilience (in older persons). These factors are described using different terms but the terms (protective) factors and resources are the most generally applied. These factors can help a person to reach a positive response and are, in most cases, assumed to enhance competence in the face of the stressor, help a person meet the demands of the stressor, or buffer the effects of the stressors. The combination of these factors determine the response to a stressor (Halkitis et al., 2017; Hayman et al., 2017; Windle, 2011). However, these factors are also described to co-determine whether specific circumstances are experienced as a stressor (Hayman et al., 2017; Richardson, 2002). Many different specific, individual and environmental factors are described in

the included texts. These factors range from biomedical characteristics (such as genetics & epigenetics, brain function, inflammation and hormonal functioning), to coping styles, hope, religious faith, health behaviour, and social support (Bennett et al., 2016; Cárdenas and López, 2010; Szanton et al., 2010; Whitson et al., 2016).

We will expand on some of the most commonly described (considerations on) individual and environmental factors. In several descriptions accommodative coping is described as an important individual factor in older persons (Fortinsky et al., 2013; Hayman et al., 2017; Richardson et al., 2014). These are more emotion-based coping-styles such as finding benefits in the experience of adversity, and positively comparing oneself with others (Fortinsky et al., 2013; Hayman et al., 2017). The importance of this particular type of coping is a result of the more chronic stressors experienced in older age; these stressors are not solvable with more active coping styles (Hayman et al., 2017). Instead, these types of stressors require acceptance, flexibility and adjustment of hopes and goals, also termed secondary personal control (Fortinsky et al., 2013; Richardson et al., 2014).

There are differing ideas on whether resilience is something that can be passively achieved by an individual (Bennett, 2010), or whether it must be actively achieved, resulting from a plan/ strategy (Felten and Hall, 2001). The latter is in line with published literature describing persons as agents of their own resilience (Bennett, 2010).

The importance of the context within this perspective is illustrated by the fact that almost all (30/36) texts within this perspective explicitly describe the role of environmental factors. Many descriptions view resilience from an ecological perspective (Bennett et al., 2016; Cárdenas and López, 2010; Donnellan et al., 2015; Grandbois and Sanders, 2009), in which the importance of the environment and the interaction between the individual and their environment is an important starting point. In developmental psychology, this ecological perspective originates in the ecological systems theory, in which Bronfenbrenner describes five environmental systems with which an individual interacts, ranging from direct family and friends to cultural beliefs and time (Bronfenbrenner, 1979). Many of the descriptions of resilience similarly include different levels of factors, also termed dimensions or categories, that interact to lead to resilience. Just over half of the included texts describe different levels of factors, and the number of levels range from two (internal, external; van Abbema et al., 2015) to six (cellular, physiological, individual, family, community, society; Szanton et al., 2010).

One environmental factor that has repeatedly been described as especially important in older persons is social support, and more specifically family support (Aldwin and Igarashi, 2012; Grandbois and Sanders, 2009; Hayman et al., 2017). Related to social support, the presence of professional help may also be of particular importance in the older population (Janssen et al., 2011; Nelson-Becker and Becvar, 2013).

Two descriptions take the importance of the environment, and specifically the community, even further by suggesting that communities should take responsibility in ensuring the resilience of individuals (Ungar, 2011; Wild et al., 2013). Communities are not only described to play a role in the resilience of older persons, but the resilience of older persons within a community is also described to effect the resilience of the community as a whole (interdependence) (Aldwin and Igarashi, 2012; Wild et al., 2013).

From a life course perspective, early life conditions (Cheung and Kam, 2012; Pruchno et al., 2015) and early life decisions (Pruchno et al., 2015) can continue to play a role in the level of resilience in later life. Of specific importance in the older population is the role of life experience in achieving resilience. Several authors suggest that previous experience with stressors may influence resilience positively (Cheung and Kam, 2012; Halkitis et al., 2017; Hayman et al., 2017), through the accumulation of factors (Aldwin and Igarashi, 2012; Foster, 1997; Nelson-Becker and Becvar, 2013). However, other descriptions stress that resilience does not lead to the linear growth of factors, but that different factors are experienced at different times (Hochhalter et al., 2011), or

the factors remain the same across age groups but the weighing of these factors changes (Hayman et al., 2017).

We highlighted some commonly described resilience factors, such as accommodative coping and social support. However, there is a great amount of variation in older persons themselves. For example, there is variation in physical, mental and cognitive health, as well as environment, such as living conditions and access to social support (Aldwin and Igarashi, 2012; Hayman et al., 2017; Shaw et al., 2014). As a result, the availability and use of factors differ between individuals (Janssen et al., 2011). Alongside the availability of factors, an individual's willingness to access these factors is also described to be essential to resilience (Donnellan et al., 2015). These considerations led to a call for an individual and subjective approach when studying resilience in older persons in particular (Hayman et al., 2017). Following similar reasoning, many descriptions emphasize the importance of describing resilience in specific sub-populations, such as a specific culture or gender. (Cheung and Kam, 2012; Felten and Hall, 2001; Gattuso, 2003; Grandbois and Sanders, 2009; Pathike et al., 2017). For example, where social support is seen as a generally accepted factor of resilience in older persons, older Hong Kong Chinese specifically were described to achieve resilience through self-reliance, as social support is often not available in this population (Cheung and Kam, 2012).

3.3.3.2. Perspective 2. Different terms, such as process (Montpetit et al., 2010), characteristic (Varadhan et al., 2008) and capacity (Gijzel et al., 2017), are also used to describe resilience within this perspective. However, inherent to the dynamical systems approach, and thus similar across descriptions, is the fact that resilience is understood as a dynamical reaction to circumstances, changing over time and contexts.

Similar to perspective 1, there is an interest in finding factors that influence resilience. The dynamical systems models can be applied to find factors that play a role in reaching resilience. Similar to most of the texts within perspective 1, one of the texts explicitly expresses an interest in factors on multiple levels (individual and community; Montpetit et al., 2010).

On a higher level, resilience in homeostatic regulation is also described to be the mechanism underlying frailty (Varadhan et al., 2008).

4. Discussion

4.1. Main findings

This review demonstrated that there is considerable consensus on resilience in older persons overall. Three common features of descriptions of resilience were identified: a stressor, a response and a mechanism. Other important points of consensus are that resilience is dynamic, and that the context plays an essential role.

The largest amount of variation between the descriptions was found in the expression of resilience through the features of stressor and response. This led to two perspectives being distinguished. The first, classical and most widely applied perspective, describes a resilient response as a (more) positive (than expected) response to a high intensity stressor. The second, newer and less frequently applied perspective, describes resilience in the context of responses over time relative to equilibrium, following (frequently occurring) low intensity stressors.

These main findings and the resulting framework are based on a systematic and comprehensive review of the conceptual literature in aging, however they are not necessarily specific to the older population. This may be an indication that we touch on the fundamental features of resilience. The general framework of resilience is versatile and applicable in different situations and populations. Perspective 2, in particular, is inherently versatile; the dynamic systems approach was originally developed within the physical sciences and has since been

applied in many different fields.

4.2. Findings specific to older persons/aging

Some of the prominent findings within perspective 1 are, however, specific to the older population. The most important may be the importance of chronic stressors such as disablement in this population. The chronicity of many stressors in this population also has consequences for the response that is described to be resilient, and the mechanisms which play a role in this response. A resilient response in this population is described, not only as an increase or stable functioning, but also as functioning at a lower (but relatively good) level, following exposure to a stressor. An important factor in dealing with more chronic stressors is an accommodative coping style and meaning regulation (Bauer et al., 2010; Fortinsky et al., 2013). Life experience and knowledge of, and belief in, one's ability to overcome are other important factors in reaching resilience specifically in the older population (Gattuso, 2003; Hayman et al., 2017). Social support is described within both perspectives to be a contextual factor of particular importance in the older population (Aldwin and Igarashi, 2012; Montpetit et al., 2010).

Links between resilience and frailty, a common concept in aging, are described. Frailty is described to be the most important source of stressor in this population (van Abbema et al., 2015). Conversely, within perspective 2 frailty is linked to the loss of resilience (Gijzel et al., 2017; Varadhan et al., 2008).

A large amount of heterogeneity (in different aspects such as cognitive, physical and social functioning) is characteristic of the older population. Therefore, the role of the individuals themselves, even those with cognitive impairment, in determining the features of their resilience is thought to be of particular importance (Hayman et al., 2017; Williamson and Paslawski, 2016).

Older persons are seen as a valuable population for the study and application of resilience because of the combination of an abundance of stressors at this age, the wisdom and experience older persons have accumulated, and possible selection/survivorship (Aldwin and Igarashi, 2012; Foster, 1997; Hayman et al., 2017; Montpetit et al., 2010; Nelson-Becker and Becvar, 2013; Ryff et al., 1998). Studying resilience in older persons may therefore lead to insights which can be applied in younger populations (Foster, 1997).

4.3. Contribution of this review

This detailed overview of the conceptual literature contributes to an increased level of clarity on the current conceptual status of resilience research in older persons. Although at first glance resilience seems to lack conceptual clarity, there is a substantial amount of agreement within the conceptual literature. This consensus is partially masked by the fact that the different descriptions do not seem to build on each other. Authors often present new descriptions of resilience, which appear to be new combinations of aspects that were described previously. In other words, there is a low level of cohesion within the literature. The inconsistency in the use of terminology (e.g. stressor, adversity, challenge, etc) results in a further loss of clarity and loss of opportunity to build on previous literature. This review could be a first step towards a higher level of consistency and conceptual clarity in future research on resilience and, subsequently, allow for a more consistent application of resilience in (clinical) practice.

Several possible applications of resilience are described by the texts included in this review. The resilience of a person can be quantified using the descriptions of resilience, allowing care professionals or clinicians to assess whether an intervention is appropriate (de Guzman et al., 2017). Furthermore, empirical studies using the descriptions can provide insights into the factors within the mechanism of resilience which can ultimately lead to possibilities for the promotion of resilience through intervention and policy (Bennett et al., 2016; Fortinsky et al.,

2013; Halkitis et al., 2017; Hayman et al., 2017; Hochhalter et al., 2011). Within perspective 2, the responses to the low intensity stressors can function as prospective indicators of resilience of the individual to higher intensity stressors. As a result of this prospective and predictive nature, these descriptions can help to inform clinical decision making, for example in determining someone's eligibility for a surgery (Gijzel et al., 2017). This real-time assessment of resilience is of particular importance in older persons, whose condition constantly changes.

For researchers and clinicians who wish to use resilience in their work it is important to consider the implication of the areas of consensus and variation/debate this review has revealed.

4.3.1. Considerations resulting from areas of consensus

Based on the (relative) consensus described here, we advise that a description of resilience in older persons should describe a dynamic character of resilience, a stressor, a response, and an interest in both individual and environmental factors. One should consider on what levels these factors are experienced.

The three essential features of the descriptions of resilience which are identified here: a stressor, a response and a mechanism, are in line with findings from earlier conceptual reviews and concept analyses (Hicks and Conner, 2013; Whitson et al., 2016; Windle, 2011)

Different texts have described the discussion surrounding resilience as a trait or process to be an important aspect of the conceptual ambiguity surrounding resilience in older persons (Allen et al., 2011; Fortinsky et al., 2013; Nelson-Becker and Becvar, 2013; Pathike et al., 2017). However, this review shows that although different terms are used when describing the mechanism of resilience, there is general consensus that resilience changes over time and context, involving both environmental and individual factors. The importance of context was not only described in relation to the mechanism, but also in consideration of the stressor and response. This is in agreement with the findings of a review of the concept of resilience in the empirical literature, which typifies resilience as a contextual and dynamic process (Aburn et al., 2016). Although there is some variation in the number and exact levels of factors which are assumed to influence resilience, ranging from the cellular to the cosmosystem, there is consensus on the importance of factors on different levels.

4.3.2. Considerations resulting from areas of variation/debate

A large amount of variation was found in the stressors described. We advise that a stressor should be chosen depending on the context and goal of the resilience research/ application. Aspects of the stressor that may be considered are: the chronicity or acuteness, possible accumulation of stressors, and the role of the individual experiencing the stressor. Furthermore, the intensity of the stressor can vary from low intensity, day-to-day stressors to particularly challenging events/ circumstances. If there is an interest in involving the reaction to day-to-day stressors, perspective 2 (dynamical systems modelling) should be seriously considered. The role of the low intensity day-to-day stressor type within perspective 1 is an area of debate in the literature (Whitson et al., 2016; Windle, 2011).

Within perspective 1, chronic stressors and a combination of stressors are of particular interest in an older population. Furthermore, the older person's perception of the stressor should be considered.

Again, the domain of response can be determined depending on the context and goal of the resilience description. This domain can be anything from physical functioning to quality of life. This variation in domains seems to be accepted, and in general is not a specific point of discussion within the literature. Thoughts on the role of subjectivity in the determining of a resilient response differ between descriptions. Within some descriptions, the subjects or their representatives determine a response to be resilient based on their own interpretation, and within other descriptions the resilient response is stipulated by the researchers. Between descriptions of researcher-defined resilient response within perspective 1, there is debate whether the experience of negative

affect or (di)stress fits within a resilient response, or whether these negative experiences preclude a subject from being categorized as resilient.

As the course of response is the aspect of resilience surrounded by the most variation and debate it should be considered carefully. Again, one should take into account the context and goal of the resilience description. Within perspective 1, five possible courses of response have been described and different authors argue for the use of different courses. Some descriptions allow several possible courses, others feel only one specific course can be interpreted as resilient. For example, where some descriptions are adamant that resilience entails growth, characterizing it as an extraordinary response (Hochhalter et al., 2011; Pruchno et al., 2015), others feel growth may not be relevant in the context of old age and the presence of chronic stressors (Hayman et al., 2017). However, the course involving the avoidance of a stressor as a resilient response is particularly controversial. It is described in one description (Rosowsky, 2011), but other descriptions argue against this interpretation (Pruchno et al., 2015; Ryff et al., 1998). Avoidance of a stressor may not be an appropriate course to include in resilience research as there seems to be general consensus on the necessity of the presence of a stressor in order to speak of resilience. In perspective 2, the exact course of the response that is considered to be resilient is determined for a large part by the mathematical dynamical systems model that is chosen, and always includes a shorter recovery time to equilibrium after disruption.

Although it is important to strive for a certain level of consistency and agreement, the fact that resilience allows for some variation in its exact description allows it to be applied in a variety of different research and clinical contexts. This is another expression of the versatility of resilience, which we feel is a strength.

4.4. Strengths and limitations

This is the first review to give a detailed overview of resilience descriptions across disciplines, leading to the description of two perspectives in conceptual literature. In contrast with earlier concept analyses and reviews (Hicks and Conner, 2013; Whitson et al., 2016; Windle, 2011), this review did not aim to develop a new concept or model of resilience in older persons, allowing instead, for a systematic and detailed overview of how different authors currently view resilience in older persons. Furthermore, as resilience is a rapidly developing field, this current review is able to include recent developments.

The search terms and criteria described here might have led to missing certain descriptions of resilience. Only descriptions of resilience or resiliency were included in the search, therefore related concepts, such as hardiness, were not included in this overview. Full texts solely describing a measurement scale of resilience as a trait without describing a conceptual basis for this scale were excluded, as they did not meet the criterion requiring a description of different components and their relationship to each other. This may have resulted in a higher level of consensus on the importance of the context and the finding that resilience constitutes several features.

Furthermore, only descriptions that were developed for older persons or adapted or applied to older persons were included. The search terms required mention of a concept/model in the title/abstract, and inclusion criteria demanded that texts described a new (aspect of) a description. As a result, no purely empirical work was included. Therefore, not all 'descriptions' that were developed in a different population, but were applied in older persons, are included in this overview. Two earlier reviews give an overview of results of empirical resilience studies in older persons (MacLeod et al., 2016; van Kessel, 2013).

The inclusion criteria requiring a description of individual resilience may have resulted in a focus on the individual aspects of resilience in this review, possibly downplaying the importance, for example, of community.

4.5. Implications for research, policy and practice

Resilience is considered attractive as a result of its positivity, inclusiveness, dynamic nature, and the incorporation of the context. However, future research will need to show whether resilience is a genuine scientific concept. Although there is some debate, most descriptions were related to the metaphor associated with the original meaning of the term as etymology provides it to us (resilire: to jump back/recoil). One might argue that the preservation of this association in future research is essential to a concept. Based on the results of this review, it seems that there is more conceptual clarity than suggested previously. Future research can build on this conceptual clarity, demonstrate the explanatory and predictive value of 'resilience', and further explore its relationship with other emerging concepts in ageing research, such as frailty and intrinsic capacity.

Some researchers within the field are concerned that with its focus on strengths, resilience may be used as an excuse by society or policy-makers to transfer responsibility to the individual or "blame the victim". These concerns were expressed by two of the texts included in this review (Ungar, 2011; Wild et al., 2013). These researchers emphasized that individual resilience is interwoven with community resilience, and that community and society therefore have a responsibility in enabling individual resilience. Despite the fact that this review is based on a search specific to individual resilience, the importance of context is a main finding, further substantiating that an older person's resilience is not determined solely by their personal characteristics. This finding therefore underscores the importance for social and health policy.

As mentioned, research may aim to better understand and improve resilience in older persons by providing insight into the factors which play a role in allowing for the development of intervention on both the individual and community-level. Furthermore, we feel research on resilience may also help identify areas or people that deserve more attention in the process of fostering resilience, thereby promoting resilience-friendly policy. The possible impact of research on policy should be an important consideration in future research. Promotion of resilience in older persons can even ultimately improve the resilience of community and society through, for example, volunteering and sharing of knowledge (Aldwin and Igarashi, 2012; Madsen et al., 2019; Ungar, 2011; Wild et al., 2013).

4.6. Conclusion

Although there is some variation in how resilience in older persons is described within the conceptual literature, overall, there is a high level of consensus on three common features of descriptions of resilience: a stressor, a response, and a mechanism. Two perspectives can be distinguished based on how resilience is thought to be expressed. What these perspectives have in common is that resilience is seen as dynamic, and that the context is of the utmost importance. These conclusions can help to achieve a higher level of consistency in the use of resilience in future research and clinical practice. However, some variation in the descriptions of resilience allows resilience to be applied in a diversity of different contexts, which can be considered a strength.

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CRediT authorship contribution statement

M.J. Angevaere: Conceptualization, Data curation, Formal analysis, Writing - original draft, Writing - review & editing. **J. Roberts:** Data curation, Formal analysis, Writing - review & editing. **H.P.J. van Hout:** Conceptualization, Formal analysis, Writing - original draft, Writing - review & editing. **K.J. Joling:** Conceptualization, Formal analysis,

Writing - original draft, Writing - review & editing. **M. Smalbrugge:** Conceptualization, Formal analysis, Writing - review & editing. **L.J. Schoonmade:** Data curation, Writing - review & editing. **G. Windle:** Conceptualization, Formal analysis, Writing - review & editing. **C.M.P. M. Hertogh:** Conceptualization, Formal analysis, Writing - review & editing.

Declaration of Competing Interest

The authors report no declarations of interest.

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Appendix A. Supplementary data

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