How reflecting develops and affects well-being throughout childhood
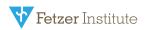
Marloes Vrolijk, Dominic Richardson and Sabbiana Cunsolo

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Correspondence should be addressed to:

UNICEF Office of Research – Innocenti
Via degli Alfani, 58
50121 Florence, Italy
Tel: (+39) 055 20 330
Fax: (+39) 055 2033 220
florence@unicef.org
www.unicef-irc.org
twitter: @UNICEFInnocenti
facebook.com/UnicefInnocenti

How reflecting develops and affects well-being throughout childhood

Marloes Vrolijk[i]

Dominic Richardson[ii]

Sabbiana Cunsolo[iii]

i   Research Consultant, UNICEF Office of Research – Innocenti
ii Chief, Social and Economic Policy Analysis, UNICEF Office of Research – Innocenti
iii Research Consultant, UNICEF Office of Research – Innocenti

ABSTRACT

Reflecting, or thinking about one's own thinking, is understood by the Learning for Well-Being Foundation as a core capacity for well-being. This mapping paper explores the empirical and conceptual evidence in support of and against this conceptualization. The method applied is electronic database searches in three databases through key terms based on the conceptual framework. Both 'reflecting' and 'metacognition' were applied as key search terms in this study. The resulting evidence base was further analysed through the application of content and quality assurance inclusion and exclusion criteria. The 29 resulting studies are further described for insights into the development of reflecting throughout childhood, reflecting in formal and informal education, reflecting in social settings, and reflecting and well-being. From the review of the literature, metacognition has been found in young children. Various studies emphasize the importance of the social context and other individuals such as caregivers and teachers for the development of reflection. The results for the relationship between reflecting and well-being are diverse: some studies find negative effects of reflecting for well-being while others find positive effects. In combination with an exploration into the existence and impact of eight other possible core capacities for well-being, this study can contribute to the understanding of core capacities possibly benefiting child well-being.

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CONTENTS

1. INTRODUCTION

Reflecting, or thinking about one's own thinking, is understood by the Learning for Well-Being Foundation (L4WB) as one of the possible core capacities which may influence well-being in children (O'Toole, 2016). This study explores the academic literature for theoretical and empirical evidence in support of this conceptualization. The main research question which this study explores is: drawing from a multidisciplinary evidence base, what is the empirical and theoretical evidence of children's reflecting and how does it interact with overall well-being throughout childhood? The objectives of the review are to map the evidence of the development of reflecting in children, describe possible gaps in the literature and search whether any studies explore reflecting as a core capacity, or study the relationship between reflecting and child well-being. In doing so this paper focuses on the possibly diverse development of the core capacity in children, on the capacity in parents, teachers and other caregivers and the role they play in the development of the core capacity, and on the evidence from the academic literature of the four perspectives introduced by the L4WB approach. This paper elaborates further on the conceptual underpinnings relating to reflecting as a core capacity below. The study continues with the method, results and discussion.

This paper is part of a broader attempt to map the available empirical and theoretical literature on children's core capacities that might affect child well-being. This is a first attempt to map the existing theoretical and empirical literature about one of these core capacities: reflecting. Further background information on the L4WB conceptual framework and the Measuring What Matters (MWM) project can be found in the MWM overarching introduction and background paper.

2. CONCEPTUAL UNDERPINNINGS

According to the L4WB framework (Learning for Well-Being Foundation, 2019), reflecting is conceptualized as follows:

> Reflecting involves considering events, feelings, and thoughts in a way that makes explicit what has been tacit. It suggests revisiting and reconsidering what has happened; when cultivated, reflecting encourages knowing what you could have done differently. Reflecting can be contemplative but is also active, especially in the sense of mirroring with regard to other people and the environment. There is a 'feedback loop' in reflecting/mirroring: the capacity for offering to oneself and others what has been seen, felt or sensed, and accepting and receiving feedback into the system. Reflecting is a basis for metacognition – thinking about how one thinks. (p. 4)

From this definition a broader concept related to reflecting is introduced: metacognition, which is not defined by the L4WB foundation. This study applied both reflecting and metacognition as search terms in order to find relevant studies. These search terms may still not fully capture the broad definition of reflecting proposed by the L4WB.

According to the L4WB hypothesis, each core capacity can be experienced through various perspectives (mental, emotional and physical) and should have a spiritual dimension. Based on the L4WB definitions for reflecting, a matrix is applied to categorize all studies identified in this working paper (*see Table 1*). Applying the matrix to the literature on reflecting contributes to understanding

how the literature allows for the theoretical classification of reflecting within L4WB's four perspectives. The results section compares all studies placed in the matrix as a full body of evidence. More background information on the development of the Matrix of Four Perspectives is available in the MWM overarching background paper.

Table 1: Matrix of Four Perspectives on reflecting

	content 'what'	*process* 'how'	SPIRITUAL (S) *intention* 'why'
MENTAL (M)	A *mental perspective* refers to "our cognitive and rational processes" and the functions of "envisioning, planning and valuing" (O'Toole, 2016, p. 17).	"A *mental* expression of reflecting is associated with aligning ideas, values and actions. It's about coherence and consistency" (Learning for Well-Being, 2019, p. 4).	"At a 'spiritual' level, reflecting is expressed as aligning with the cosmos, experiencing the largest of cycles mirrored in one own life cycles" (Learning for Well-Being, 2019, p. 5).
EMOTIONAL (E)	An *emotional perspective* refers both to "our intrapersonal functions – our inner feelings, motivations and our interpersonal functioning – [and] our interactions with others" (O'Toole, 2016, p. 17).	"An *emotional* expression of reflecting is associated with clarifying and discerning feelings, knowing the impact of ideas and actions on the emotions. It includes the sensitive reframing of those feelings" (Learning for Well-Being, 2019, p. 4).	
PHYSICAL (P)	A *physical perspective* refers to "the physical senses, to our bodies, and to the material and natural environments" (O'Toole, 2016, p. 17).	"A *physical* expression of reflecting is associated with digesting and integrating events and actions. There is often a future action/ different choice embedded in this association" (Learning for Well-Being, 2019, p. 5).	

3. METHOD

The purpose of this study is to map the empirical and theoretical evidence of reflecting, as it relates to children and adults working with children. This working paper is a literature review that takes a systematic approach.

3.1. Systematic search procedure

Systematic searches were conducted in the following electronic databases: PubMed, ERIC (Education Resources Information Centre) and EBSCO.

To focus the search on studies likely to meet the inclusion criteria, a list of key search terms was created. List 1 includes terms or phrases related to reflecting based upon the conceptual framework, list 2 includes terms or phrases related to the population of interest and list 3 includes terms related to the focus of the research question (Appendix A). Each search included terms from each list that were inserted as free text into the keyword fields. All possible combinations of terms across lists were searched separately. At all times, if the search with terms as free texts delivered too many results, the searches were limited by applying relevance sorting options. The first 25 most relevant hits were scanned for each search. In all databases, due to the strong overlap while using children and adolescents, a combined search was used (e.g., 'Reflecting AND (Children OR Adolescents) AND Development)', after which the most relevant hits were scanned.

Each independent search was conducted for a five-year period to find the most recent results (2015–2020) and the past 20 years (2000–2020). All findings were limited to English, peer-reviewed studies by selecting the relevant options in each database. For each combination of search terms, the literature was also scanned for existing literature reviews, systematic reviews or meta-analyses by selecting the databases' option to focus on reviews in the past 20 years. If this option was not available, a separate search with the key terms combined with 'review' was conducted.

3.2. Inclusion and exclusion criteria

To be included a study had to meet various criteria at different levels of the review process. During screening and identification, a study had to include children or adults who have a direct and explicit link with children, and it had to include an explicit link to reflecting, its development or its connection to well-being. When studies met these principal inclusion criteria, they still needed to meet quality tests for eligibility: that they be conceptually coherent, use appropriate methods and be scientifically valid (Appendix B). The ethical conduct of each study was reviewed but was not a requirement for inclusion. The included materials had to be in a standard format (such as papers, reports and policy briefs) and not duplicate a study already included. Studies that did not explicitly explore the development of reflecting were excluded, as were those that explored the development of reflecting solely in adults without any connection to children or adolescents.

All searches were recorded and the details of searches, number of studies excluded at the first screening stage (on title and/or abstract), details of studies rejected at the potential eligibility stage (based on reading relevant parts or the full study) and details of studies accepted were documented. The detailed record of studies was archived and is available upon request. The flow diagram in Table 2 includes an overview of how many studies were identified, and retained based on the inclusion and exclusion criteria.

To answer the research question, subsections discuss the various research interests, such as the development of the behaviour across childhood, the effect of interaction between professionals and children for developing reflecting, and possible links with well-being.

Table 2: Flow diagram for the reflecting review

	Studies	Excluded studies
IDENTIFICATION	Studies identified through database searching including duplicates (*n* = 155,130). *Titles were read when appearing within the first 25 most relevant results.*	Studies excluded based on relevance hierarchy in databases (*n* = 153,681).
	Study titles read through (*n* = 1,449). *When relevant abstracts were opened and read through entirely.*	Studies excluded based on titles/abstracts (*n* = 972) and non-availability (*n* = 37)
SCREENING	Study abstracts read through (*n* = 440). *When relevant the full papers were loaded.*	Studies excluded based on abstracts (*n* = 171).
	Abstracts accepted and full papers loaded (*n* = 269).	Studies excluded based on fuller reading (*n* = 99).
ELIGIBILITY	Papers read through more closely (introduction, methodology, conclusion) and sorted within relevant subtopics when meeting the inclusion criteria (*n* = 170).	Studies excluded after full reading and final checks (*n* = 90).
	Papers read more fully and inclusion criteria checked (e.g. self-regulation studies, studies not including children or adults linked to children should have been excluded) (*n* = 80).	Studies excluded after final checks (*n* = 51).
INCLUDED STUDIES	Full paper read and included in the results (*n* = 29).	

3.3. Reflecting from the perspective of spirituality

To respond to the gap in evidence for reflecting from the perspective of spirituality, an additional search round was conducted to incorporate possible evidence from the spiritual perspective on reflecting. To identify high-quality evidence relating to spirituality and reflecting the input of various experts was considered including the Learning for Well-Being Foundation, the Fetzer Institute and relevant individual researchers focusing on spirituality. Additional searches have been conducted to find alternatives for suggested articles which were not available. Overall, 44 full studies were examined for the core capacity focus of this specific paper. This was done through searching for the key terms 'reflecting' (search term 'reflect') and 'metacognition' (search term 'metacognit') in the full text of the 44 studies.

The inclusion and exclusion criteria were applied to the resulting list of spirituality articles. This time, the suggested articles and books were included only when the study was: explicitly focused on spirituality; of an empirical nature; on reflecting or metacognition; focused on children or adults who have a direct and explicit link with children. Moreover, the same quality assurance and general inclusion criteria as in the main inquiry searches applied (Appendix B). A detailed record of studies was archived and is available upon request. While 24 studies resulted that mentioned the terms 'reflecting' or 'metacognition', all were excluded after fuller reading. The studies did not pass the quality assurance assessment criteria or were irrelevant for the reflecting capacity. No studies resulted from the spirituality searches.

3.4. Applying the Matrix of Four Perspectives

Each of the qualified studies included in the review is positioned within the Matrix of Four Perspectives in order to determine to what extent the L4WB hypothesis is supported with evidence. The matrix in Table 1 is applied to organize the articles in the various categories (mental, emotional, physical or spiritual) and levels (content, process or intention). In Table 3 descriptions of possible studies for the various categories are provided. These descriptions were applied to categorize the included studies and are based on L4WB publications (Table 1).

After the matrix was applied in the various mapping papers on capacities, two authors compared the application matrix, discussed the placement of articles which raised questions and made necessary adjustments. When agreement was not reached the authors checked the application of the matrix again and discussed the questioned papers until agreement was reached. From the 29 included papers in this study, 27 were placed in the matrix. The placement of 10 studies was discussed with two authors and after the review process the positioning of 1 study was adapted. The inter-rater reliability was 96.3 per cent.

Table 3: Types of studies for the Matrix of Four Perspectives

	content 'what'	process 'how'	SPIRITUAL (S) intention 'why'
MENTAL (M)	Studies on the presence of the capacity in children.	Studies that explore how the capacity develops throughout childhood/ in response to specific individual interventions.	Studies on how children perform/show the capacity and studies on spirituality.
EMOTIONAL (E)	Studies on the relationship between the capacity and feelings/interpersonal relationships.	Studies on how relationships and/or feelings relate to the capacity.	
PHYSICAL (P)	Studies on the physical aspects of the capacity, or on doing the action.	Studies into how doing the action and/or the physical environment relate to the capacity.	

4. RESULTS

Overall, the two key search terms gave a huge variety of results. From the three databases together, the search term 'metacognition' resulted in 112 full papers which were accessed after abstracts were read through. The search term 'self-reflection' resulted in 58 full papers which were accessed. After all selection criteria were applied, 33 empirical and conceptual papers were included.

'Metacognition' gave results from across various disciplines including developmental psychology, neurocognitive research, sociology and educational research. This was not the same for searches for '(self-)reflection', which mainly resulted in studies relevant for the sections on education and well-being. While 'metacognition' gave many results for child development,' self-reflection' is often used in the education literature. Still, many studies which appeared in the searches included some link to reflecting. In order to manage the number of results, studies were only accepted when reflecting was the principal focus of the study.

In ERIC, self-reflection and reflection gave very similar results. Moreover, the ERIC searches for metacognition produced many results for mindfulness and well-being, which were not necessarily related to reflection or metacognition. In EBSCO self-reflection gave much more useful results compared to reflection. Therefore, the main searches were conducted with self-reflection and metacognition. Similarly, the more specified searches in PubMed (with terms from all three key term lists) were only conducted with self-reflection. This helped to get more specific and focused results, and a more relevant selection (for 'self-reflection' one search resulted in 16 abstract reviewed and 10 studies accepted while the same search for only 'reflection' gave 3 reviewed abstracts and 1 accepted study). Still, a general search for reflection was conducted in all databases.

Searches for 'reflection' and 'metacognition' gave numerous results. Related concepts also had many results, such as 'reminiscing' or 'rumination' and 'self-regulation'. For the scope of this paper it was not feasible to include all related results. Studies on related topics could not be included. A few examples of excluded topics are: metamemory and interoceptive beliefs on the body, wisdom including self-reflection, and studies that solely examined self-regulation. Moreover, studies focused solely on rumination that did not include reflecting or metacognition were excluded as well. Four excluded studies contained relevant links to reflection and well-being but did not focus on children and were therefore excluded from this review. These studies considered feelings of shame and self-reflection, sense of agency, resilience and socio-emotional well-being.

4.1. Conceptual findings

Overall, the majority of the studies selected focused primarily on metacognition. From the 29 included studies, only 8 studies did not. In three studies the conceptualization centred on self-reflection (Bohanek and Fivush, 2010; Cooke et al., 2017; Pena and Losada, 2017), and five studies defined metacognition using the term 'reflection' and/or 'thinking about thinking' (Dörr and Perels, 2019; Goupil and Kouider, 2019; Salmon, 2016; Vaccaro and Fleming, 2018; Veas et al., 2018).

The three studies on reflecting conceptualized reflecting in various ways. Pena and Losada used a model with two types of dispositional self-focus including rumination and reflection (p. 2). Bohanek and Fivush (2010) studied internal state language for which reflection is considered a main construct (pp. 368–369), while Cooke et al. (2017) focused on parental reflective functioning (PRF) (p. 561). Other studies used metacognition almost synonymously with self-reflection, especially studies from

PubMed (e.g., Goupil and Kouider, 2019). Overall, the conceptual results of reflecting were few, and when a study focused on reflecting, it was either applied to another construct (e.g., learning or self-focus) or used to measure another construct (e.g., internal state language). Most studies focused on metacognition.

There is a need to provide a 'thorough unified definition' of metacognition, which has been conceptualized inconsistently and incoherently (Zohar and Barzilai, 2013, pp. 122–123). In the field of science education, most studies on metacognition are based on self-regulatory frameworks related to early theorists such as Brown (1986) and Flavell (1979) (Thomas and Anderson, 2012, p. 1246). Various studies appearing from the metacognition literature referred to John H. Flavell, who is connected to the introduction of the concept of metacognition in the 1970s (Robson, 2016a, p. 3; Faedda et al., 2017). Flavell (1979) understood four classes of phenomena through which cognition can be monitored: "(a) metacognitive knowledge, (b) metacognitive experiences, (c) goals (or tasks), and (d) actions (or strategies)" (p. 906). Robson (2016a) emphasized that Flavell included both cognitive and affective states within the understanding of metacognition and specifically metacognitive experiences (p. 3): "[m]etacognitive experiences are any conscious cognitive or affective experiences that accompany and pertain to any intellectual enterprise" (Flavell, 1979, p. 906). Others claim that Flavell initially attempted to understand metacognition as primarily a cognitive state, only including 'thoughts about thoughts' (Louca-Papaleontiou, 2019, p. 57).

Further studies that accepted Flavell's definition focused on the distinction between metacognitive knowledge, metacognitive monitoring and self-regulation. Self-regulation is considered to also include metacognitive skills, causing studies to distinguish between metacognitive knowledge and metacognitive skills (Zohar and Barzilai, 2013, p. 122). This concept of self-regulation appeared regularly in the searches. According to some studies, metacognition can be understood as one of the elements of self-regulation (Dent and Koenka, 2015; Robson, 2016a). Robson (2016a) quoted Hadwin and Oshige's work with their "useful working definition on self-regulation: The process of becoming a strategic learner by actively monitoring and regulating metacognitive, motivational and behavioural aspects of one's own learning ([Hadwin and Oshige,] 2011, p. 258)" (p. 2). Further related results were found in the literature about executive function (EF). A definition of EF explains that it: "refers to important socio-emotional and cognitive skills that are known to be highly correlated with both academic and life success" (Gonzalez et al., 2014, p. 1). These definitions show how self-regulation and executive functioning are much broader constructs compared to metacognition. Due to the high number of results for metacognition, as well as in the field of self-regulation, papers were excluded that focused purely on self-regulation or executive functioning without mentioning metacognition explicitly. Overall, related concepts included metacognitive monitoring, self-regulation and executive functioning.

Another concept which appeared in the searches was self-consciousness. A study by Şimşek et al. (2013) started with the concept of self-consciousness, which is considered to be either self-reflective or self-ruminative (p. 294). This study was excluded because there was no link with children. However, the dual understanding of self-focus was similarly introduced in other included studies (e.g., Pena and Losada, 2017). Studies purely focusing on rumination were excluded since repetitive negative thought might be a possible result of excessive self-reflection, but does not cover the full concept of self-reflection. Various included studies explicitly make references to self-rumination.

Other relevant related concepts were found in the systematic searches. Again, due to the vast number of results, this mapping paper had to restrict the included studies to those focusing on metacognition and reflection. Other relevant constructs which can be further explored in the future are, for instance, introspection and theory of mind studies. Louca-Papaleontiou (2019) gave a clear interpretation of the relationship between these relevant concepts and reflection/metacognition in a review within developmental psychology focused on metacognitive awareness, defined as: "being aware of how you think and how you learn" (p. 57). This perspective on metacognition requires other related concepts such as introspection:

> [A] prerequisite to the development of such a metacognitive awareness is one's ability to introspect: that is, to examine one's own conscious thoughts and feelings and observe one's own mental states. In general, we can say that 'metacognitive awareness' means being aware of how you think, and 'introspection abilities' is the way leading to it through self-reflection. (p. 57)

Moreover, metacognitive awareness has both verbal and nonverbal aspects that can be measured (Louca-Papaleontiou, 2019). For this review study, which primarily focuses on self-reflection, the link between metacognitive awareness and introspection is very relevant, and it is recommended that 'introspection' be a key term searched when exploring further empirical evidence of reflecting.

Louca-Papaleontiou (2019) additionally described how the development of both metacognitive awareness and introspection abilities has been part of the research discipline of 'theory of mind' for young children especially. Developmentally, theory of mind is considered to be a prerequisite for social interactions. It is defined as:

> [The] understanding children have of their own and others' minds and of the relation between the mind and the world. This understanding enables children to predict and explain actions by ascribing mental states, such as beliefs, desires and intentions to themselves and to other people. (Astington, 1991, p. 158, cited in Louca-Papaleontiou, 2019, p. 57)

While the insights on theory of mind are related to this study, the primary focus of this paper does not lie with reflections upon another's thoughts. Thus, while an overlap with reflecting is recognized, studies on theory of mind are excluded and might be more relevant for empathy, one of the other core capacities included in this series of studies.

Finally, through the link with both self-reflection but also metacognition and self-awareness, plenty of mindfulness results appeared, but this is not the focus of the present paper. The paper on the core capacity of relaxing includes many links to mindfulness.

4.2. Reflecting and development across the life course

Within the self-reflection literature, some studies described the development of self-reflection. The metacognition literature had many results.

Two review studies on metacognition emphasized that an early perspective, for instance by Piaget, was that "young children have been considered as having little or no awareness of their mental activity" (Louca-Papaleontiou, 2019, p. 58; Goupil and Kouider, 2019). Moreover, the awareness of thinking about one's own thinking was believed to start developing from ages 7 to 12 years (Louca-Papaleontiou, 2019). However, other studies contradicted these conclusions. Goupil and Kouider (2019) reviewed various empirical studies which showed that basic forms of metacognition develop early, even in preverbal infants. These studies used nonverbal paradigms and suggested that core metacognition develops earlier than previously thought. They suggest that the belief that metacognition would only develop later in childhood was probably influenced by the ability to accurately communicate metacognitive thoughts. Approaches focused on children having to explicitly communicate their metacognitions would not be appropriate for measuring these thoughts. Approaches that can measure early metacognitive development include studies using a nonverbal confidence scale, behavioural methods adapted from animal research (such as an opt-out paradigm), comparative psychology and neuroimaging (pp. 1–2). Goupil and Kouider (2019) proposed that infants already possess and use basic forms of metacognition, and they proposed the existence of 'core metacognition':

> [W]e here propose that starting in the first years of life, humans are already endowed with a system of core metacognition allowing them to automatically evaluate and regulate their own cognition. (…) Specifically, core metacognition encompasses any mechanism whereby a first-order (cognitive) representation (e.g., a belief) is assessed through a second-order (metacognitive) process that evaluates its quality (e.g., the likelihood that the belief is correct given the sensory evidence) without necessarily reaching awareness or being represented explicitly. (p. 3)

Overall, the studies reviewed by Goupil and Kouider (2019) showed a "new line of evidence suggesting that young children adapt to their environment not only by considering their physical and social surroundings but also by reflecting on their own cognitive states" (p. 1). Similarly, Louca-Papaleontiou (2019) confirmed from a review study that preschool children have metacognitive awareness, contrary to previous theories.

A Belgian empirical study measured metacognition in young children by distinguishing between explicit and implicit metacognitive skills (Geurten and Bastin, 2018). They tested whether metacognition was indeed guiding children's decisions before the age of three by designing tests to measure both explicit and implicit metacognitive skills. The researchers recognized that explicit metacognitive skills, with which children deliberately consult and weigh information, were found to be influential only among children from 6 to 7 years of age. They questioned how younger children can learn effectively without having access to the metacognitive skills considered to be essential for learning (Geurten and Bastin, 2018, pp. 2–3). They hypothesized: "[o]ne explanation is proposed by Koriat's (1993, 2007) Trace Accessibility model of metacognition, which posits that metacognition is available as a tool for learning in the form of implicit access to mental operations that can influence behavior long before it can be captured by traditional explicit measures" (p. 3). This hypothesis was tested through perceptual identification tests after which children communicated their confidence in their answer through either an explicit metacognitive awareness test (pointing to a high-confidence or a low-confidence picture) or an implicit metacognitive awareness test (choosing to ask for a cue about the right answer or not). The

results showed that children from at least 2.5 years were more likely to ask for a cue (the implicit test) when having given an inaccurate response. There was no relationship between giving an inaccurate response and pointing to a low-confidence picture (the explicit test). Thus, the researchers concluded that while young children did not seem explicitly aware of their cognition, implicitly their behaviour was adjusted based on metacognitive awareness. In the researcher's words, the children showed a: "good ability to implicitly introspect on the results of their cognitive operations" (p. 12). Moreover:

> [T]hese findings suggest an early development of implicit metacognition that is dissociated from the later development of explicit metacognition. (…) From a developmental perspective, these results are important because they are among the first to show that children can rely on implicit metacognitive abilities to reflect on their task performance as early as age 2.5 (see also Goupil and Kouider, 2016; Goupil et al., 2016), suggesting that some aspects of metacognitive operations are computed automatically, possibly as soon as infants start making decisions, while more explicit aspects of metacognition emerge later and more slowly. (p. 12)

In a small-scale study, Lewis (2017) considered how Video Stimulated Reflective Dialogue (VSRD) can support children's metacognitive development between four and seven years of age. Lewis observed, interviewed and tested children's metacognition through letting children create and select video material of examples of good thinking. The intervention group engaged in reflective dialogue with the researcher to reflect on the thinking occurring in the selected video clips. From results on standardized post-tests the intervention group made more progress compared to the control group. Lewis showed that metacognition can be observed in children below eight years of age.

Other studies informed the development of metacognition among older children. Gascoine et al. (2016) reviewed studies that aimed to measure metacognition in children aged 4 to 16 years. They analysed the tools used in the studies to measure metacognition and found that the majority of the tools used to measure metacognition were self-report measures (61%), such as questionnaires, surveys and tests. Observation methods were used only for measuring metacognition in children aged four to eight years. They also found that metacognition was defined in various ways in the studies, and some measurement tools did not match the definition used (misaligned studies). They concluded that the way in which metacognition is measured can influence the evidence available about its development during childhood.

From a meta-analysis of neuroimaging studies, Vaccaro and Fleming (2018) aimed to provide insight into how metacognition functions neurocognitively. They explored whether metacognition was supported by a domain-general neural resource or has domain-specific components. A relevant part of the neuroimaging meta-analysis was the comparison between metacognition and theory of mind activations, mapped by the term 'mentalizing'. The researchers compared a metacognition map, which was developed as part of the review study, with a meta-analysis map available from Neurosynth (a database of mapping for functional magnetic resonance imaging [fMRI]). When comparing metacognition with mentalizing, the researchers found overlapping regions between metacognition and ToM, whereas unique activations for metacognition were observed:

> By comparing our results to comparable analyses of mentalising, we obtain evidence of common engagement of the ventromedial and anterior dorsomedial PFC in metacognition and mentalising, suggesting that these regions may support second-order representations for thinking about the thoughts of oneself and others. (p. 1)

The ventromedial prefrontal cortex has been linked to self-reflective processing and the role in theory of mind is "thought to support a simulation of what oneself would do in another's situation" (p. 10). The researchers explained the overlap by suggesting that "metacognition and ToM share a common computational basis that involves recursive inference about our own and others' mental states" (p. 10). Moreover,

> [U]nique activations for metacognition were observed in insula and lateral PFC, perhaps reflecting the specific contribution of introception/error monitoring and the formation of confidence estimates, respectively, during self-directed judgements. ToM, in contrast, was uniquely associated with activations in TPJ and temporal pole, consistent with previous findings that these regions are biased towards other-referential processing. (Saxe et al., 2006, cited in Vaccaro and Fleming, 2018, p. 10)

The studies showed no consistent evidence of the effects of sex on reflection in children. A study that explicitly focused upon differences between sexes is Gharial et al. (2017). They measured levels of metacognition and multiple intelligence in rural adolescents in Punjab, India. The results showed that while the majority of participants scored at an average level of metacognition, females had better mean scores than males for various components and sub-components of metacognition (p. 260). Moreover, "girls had better knowledge and control over their own thinking and learning activities, were better aware and had good regulation of their cognition, including knowledge about appropriate strategies" (p. 269), including information management strategies and debugging (which correct errors in comprehension and performance). Burwell and Shirk (2007) investigated the effects of rumination on depression for 12-to-15-year-olds in the United States. They found that females scored higher on reflection in a self-reported questionnaire compared to males, but levels of brooding were similar (p. 60). Moreover, Esbjørn et al. (2016) found no relevant sex difference in the effect of mother's metacognitions on child metacognitions, child worry and anxiety in a Danish sample aged 8 to 12 years. Other studies did not examine sex differences. For instance, one study explicitly mentioned that it did to search for or expect differences related to sex among 5-to-7-year-olds (Larkin 2009, p. 152).

A Taiwanese study addressed how the majority of metacognition studies with children focus on Western cultures (Hsieh et al., 2013). They studied how children from different age groups told a written story out loud and chose to revise it after they were finished. Part of their research aim was to find out whether young readers show metacognitive ability while revising their telling of a written story. They found that a high majority of participants ranging from ages four to seven showed metacognitive ability by revising their stories when they were read out aloud back to them. The oldest children made significantly more accurate revisions. More uniquely, they replicated findings that were earlier based on studies with mainly children from Western cultures. Their study was conducted in a northwestern city in Taiwan and concluded that despite the generally more receptive approach to book reading in Taiwan, children in their study demonstrated similar "emerging metacognitive abilities" compared to children in Western settings (p. 1805).

4.3. Reflecting and formal education

Within the metacognition literature, the relationship between metacognition, academic performance and self-regulation was a recurring theme. Studies in this literature stream were generally excluded when not explicitly focusing on metacognition or reflection.

The relationship between self-regulated learning and academic achievement was examined in a meta-analysis by Dent and Koenka (2016). The study consisted of two meta-analyses, one specifically on metacognitive processes related to self-regulated learning (p. 426). Conceptually the authors considered that it is generally accepted that metacognitive processes include goal setting, planning, self-monitoring, self-control and self-evaluation. The researchers expected to find a stronger effect of the metacognitive processes of self-regulated learning on academic performance compared to cognitive strategies. The meta-analysis showed that composite measures of metacognitive processes had the strongest correlation with academic performance. Only one metacognitive process (planning) had a strong relationship with academic achievement by itself (p. 459). They concluded: "[t]he stronger overall correlation for metacognitive processes indicates that deciding when to use different cognitive strategies may be more important than how frequently students enact them" (p. 459).

Dörr and Perels (2019) explored training strategies to improve metacognitive skills for preschoolers. They based their study on evidence of the presence of metacognition at an early age. The interventions studied focused both on the preschoolers (direct interventions) and their parents and kindergarten teachers (indirect interventions). In the indirect conditions the caregivers were informed on metacognitive processes and strategies in order to function as a role model, were given reflecting opportunities, and were given specific strategies to support metacognitive competencies at home (for parents) or in the kindergarten (for the teachers). The study did not lead to clear results on the role of caregivers and teachers. They did find that the children improved their control activities at an early age; this is a prerequisite skill for metacognition. The study also showed a need for the development of age-appropriate instruments for measuring metacognitive abilities and self-regulated learning.

Larkin (2009) studied metacognitive thinking through an interpretive methodology with observation of child partnerships (male and female) involved in completing a writing task together. The study included children aged five to seven years, in five primary schools in South East England. The study investigated the notion that reflection is influenced by social interaction, testing whether metacognition can be socially constructed and whether it influenced the results the pairs came up with. The study built on a social constructivist view of learning, including the role of leadership, and social relations between the pairs and between the children and teacher. The results showed that pairs who took on joint or collaborative leadership styles generally showed "more complex social metacognitive profiles" and indeed co-constructed metacognitive thinking (p. 156). Seemingly important elements for complex metacognition were "task orientated motivation, cooperative rather than competitive interaction; attention to task instructions; degree of joint ownership of the task; periods of talk interspersed with silence and periods of writing and emotional stability or calmness" (p. 158). While this study was within a formal educational setting, it showed how social interaction can influence and even create metacognitive thinking in a partnership, which is transferrable to many contexts beyond the classroom.

Another aspect tested by Larkin (2009) was the role of the teacher who was considered "an obvious factor in facilitating metacognition in the classroom" (p. 157). The level of task control implemented by the teacher was the factor influencing the social metacognition profiles the most. With less control, the students had to think more for themselves. Some teachers over-supported the child partnerships. On the other hand, some teachers provided space for the children to think for themselves and facilitated reflecting during and after the tasks:

> [T]he child partnerships with the most complex social metacognition profiles were in classes where the teacher left the task open-ended, so that different ways of organising the writing were acceptable. They were also in classes where the teacher engaged the partnerships in reflection both during and after the writing task. (p. 157)

Not allowing children enough time to reflect on their thinking hindered metacognition. In reflection sessions after the tasks were completed, it helped most to ask "What helped you today?" for eliciting more complex metacognitive answers from the children. Table 4 shows codes for behaviour teachers demonstrated to support metacognitive thinking.

Table 4: Teacher codes for supportive behaviour *(Larkin, 2019, p. 157)*

(T = Teacher)	T models a strategy for spelling
T asks for checking	T models a strategy for planning
T asks for evaluation of difficulty	T refers to how decision is reached
T asks for task comprehension	T refers to past knowledge
T asks how do you know	T refers to remembering
T facilitates self-kwowledge about writing	T refers to taking another perspective
T nvc about thinking	T refers to talking with partners
T refers to how to make decisions	T refers to thinking about writing

In a theoretical review study, Louca-Papaleontiou (2019) examined social interaction within formal education for developing and improving children's metacognitive ability. They claimed that metacognition should be facilitated and supported by metacognitive language, cooperative work and social interaction among children. According to this perspective, children practise metacognitive thinking through interactions with adults and more advanced peers, especially when discussing terms related to metacognition. However, while the study built upon a base of earlier empirical studies, no empirical data were included in the study to support this theory.

Various studies investigated metacognition in natural science and mathematics education. Zohar and Barzilai (2013) reviewed studies on metacognition within science education between 2000 and 2012. They found that metacognition is increasingly integrated into studies on science education and recognized other trends. For instance, the most used instructional practice was to include metacognitive cues and prompts during activities or while discussing topics. Identified research gaps included the development of learners' metacognitive knowledge (rather than metacognitive skills), no empirical testing of the effectiveness of metacognitive instruction for science learning, not enough focus on learners in preschool and early years of elementary school and, finally, little focus on teachers'

knowledge and professional development (p. 121). Another study on metacognition in mathematics in a South African context included 339 children aged 12 to 17 (van der Walt et al., 2008). They found that children did not use appropriate metacognitive strategies in order to facilitate critical and self-reflective thinking.

Tornare et al. (2015) built on earlier research which showed relationships between emotion in education and aspects of learning, including metacognitive strategies and metacognitive experiences (p. 88). The emotions of primary schoolchildren completing a problem-solving task were studied, examining joy, pride, contentment, worry, shame and hopelessness. These emotional experiences were examined in relation to the metacognitive experience of difficulty or success. The metacognitive experience is influenced by the task, the person and the context. It is defined as: "students' task-specific appraisals of learning situations" (p. 89). The researchers found that a metacognitive experience of difficulty positively predicted the negative emotions (e.g., hopelessness), and negatively predicted positive emotions (e.g., joy and contentment). A metacognitive experience of success positively predicted positive emotions (e.g., joy and pride), and negatively predicted negative emotions (e.g., hopelessness and shame). Compared to self-concept, metacognitive experiences predicted emotions after problem solving better.

Numerous studies examined teachers' reflections and how they are stimulated during teacher training or the use of tools to encourage self-reflective practices in teaching. However, most of these did not relate the teacher's reflection practices to the development of reflecting in their students and therefore were excluded. Additionally, a stream of studies on child protection work and reflecting were excluded.

4.4. Reflecting and informal learning experiences

Few studies beyond formal education included a focus on practices or activities which may influence reflection or metacognition.

Salmon (2016) examined stimulating metacognitive thinking during young children's play: "[c]oupled with reflection, play leads to the development of thinking dispositions and promotes deep learning and understanding" (p. 480). This understanding is based on Dewey's (1938) noting that people learn from reflecting on experience rather than purely from the experience itself (p. 481). In this action research, the data were gathered in forms of stories of learning. Salmon (2016) concluded that when combining play and reflecting on the experiences of playing, children can learn metacognitive thinking dispositions. These metacognitive thinking dispositions support performance in school. However, the interpretive method is limited and the findings cannot be generalized.

An earlier review considered the general effect of physical exercise activity interventions on children's cognition and metacognition (Álvarez-bueno et al., 2017). The results showed that physical activity programmes benefited metacognitive functions and skills in children and adolescents while also benefiting non-executive and executive functions and skills.

4.5. Reflecting, families and communities

Some studies previously mentioned (e.g., Larkin, 2009) took an explicit approach to the social nature of metacognition. Two models of learning focus upon social interactions: 1) Vygotsky's social mediation of learning in terms of development of metacognition; and 2) Neo-Piagetian notions of constructivism. These "consider the interplay between emotional factors and cognitive ones, in particular the idea that it is the interaction between emotional states and cognitive ones which gives rise to reflection" (Larkin, 2009, p. 151). Additionally, reflection is considered to be influenced by social interaction, and earlier studies support the idea that individual performance in group problem-solving tasks is influenced by feelings of status within the group and the sociability of the group (pp. 151–152).

Further empirical studies concentrate on the relationship between adult and child in an informal education environment, or a home environment. For instance, an interpretive study by Thomas and Anderson (2012) considered the relationship between parental metacognitive knowledge and parent–child interactions in a museum setting. The researchers only included 12 parent–child groups who visited a specific Math Tracks exhibit, after which they were interviewed. First, the parents' metacognitive knowledge was tested, and whether this knowledge influenced their interactions with their children during the visit. From qualitative child–parent interaction analysis, researchers concluded that the parents had prior beliefs about how their children learned and thought, and adapted their interaction based on these beliefs. Moreover, all parents mentioned that they would adapt their interaction when visiting the museum with another child. Due to the voluntary nature of participation in this study and small sample size, the sample was not representative. Still, the study was included in this review because it provided a perspective on parent–child interaction and reflecting that was not studied in other studies.

Thompson and Foster (2013) investigated socioeconomic status, parent–child relationships and the relationship with metacognitive abilities for preschoolers by studying parents' metacognitive language. The researchers observed adult-child problem solving in the construction of a marble-run toy in a small sample. They were especially interested in scaffolding language defined as: "parent language that has the inherent potential to help children become aware of how they think about facets of a problem" (p. 2). Social economic status factors, such as parenting stress, were also considered. Dyadic interactions were transcribed and coded. Overall, low education level most strongly predicted weaker metacognitive questions from the parent to the child. Moreover, weaker metacognitive questions were also indirectly influenced by parenting stress levels (p. 15). The researchers found that explicit metacognitive questions were rare within all settings (only 10% of all discourse). Parents with a lower education level asked less metacognitive questions to their children. The study built on an underlying assumption that parents could affect their children's metacognitive reasoning by supporting, and scaffolding their children's thinking about thinking.

Veas et al. (2018) investigated the mediating role of metacognitive strategies between parent school involvement and their children's academic achievement. They explained parent involvement as: "a set of parent behaviours in the home and at school that support children's educational progress" (p. 2). Their study, set in the Province of Alicante in Spain, included 1,398 high school students in early adolescence. They examined metacognition in relation to self-regulated learning (SRL) strategies, and analysed a subscale of metacognition of the Learning Strategies Questionnaire. This questionnaire measured "metacognitive strategies based on SRL activities, which imply the ability to plan, monitor, and evaluate the actions involved (e.g., I start to study without any specific plan)" (p. 7). Results showed that time of support with homework had a significant relation with metacognition, while it had a direct negative effect on academic achievement. The researchers found a mediating effect of

metacognitive strategies between parent involvement and academic achievement. Metacognition was an important mediator for parent involvement both at the individual student level and the group (entire class) level. Overall, they concluded that: "parent involvement can improve children's engagement through their autonomy, which allows better emotional functioning" (p. 13).

Robson (2016b) studied the influence of adult presence on child self-regulation and metacognition and concluded that children were more likely to show evidence of self-regulation when adults were absent. In another publication on the same sample, Robson (2016a) focused on the best study methods for seeing these behaviours. After comparing observations and video-stimulated interviews, the research tools showed complementary insights. Moreover, there were differences between children showing self-regulation and metacognition while engaged in an activity and later reflecting on it. The researchers concluded that explicit reflecting, for instance in guided discussions, supports their metacognition. In an earlier publication in the same research setting, Robson (2015) looked at the difference between adult-initiated and child-initiated tasks. Robson found that children aged four to five years were more likely to demonstrate self-regulation and metacognition during child-initiated tasks. The study suggested that parental influence can also discourage metacognition in children.

Cooke et al. (2017) studied the differences between mother and father parental reflective functioning. They conceptualized parental reflective functioning (PRF) or parental mentalizing as: "the parental capacity to reason about their own and their children's behaviors by taking into consideration intentional mental states" (p. 561). Their findings showed that mother's and father's mentalizing with their children were independent from each other. Moreover, mothers scored higher for mentalizing than fathers. However, the effect of parental reflection upon their children was not included in the study.

In a Danish context, Esbjørn et al. (2016) studied the effect of maternal and child metacognitions upon child anxiety, based on a model that "metacognitions are responsible for anxiety" (p. 202). The results showed that maternal metacognitions of worry and anxiety were positively associated with children's anxiety symptoms and worry. The children's metacognitions mediated this relationship.

4.6. Reflecting and well-being

From the database searches, not many empirical studies were found which connected reflecting or metacognition to well-being in child populations. Searches with metacognition key terms resulted in more studies with negative effects on well-being compared to searches with self-reflection key terms. Various links between reflecting, metacognition and well-being are assumed in studies selected for this paper. For instance, some studies researched possible positive effects of metacognition. Vaccaro and Fleming (2018) summarized that impaired metacognition has consequences for a person's quality of life and functioning. Psychiatric patients and patients with neurological conditions often show deficits in metacognition (p. 7). However, other studies showed that a heightened focus on self-reflection can have negative effects on well-being as well (Marino et al., 2019). An excluded study explained a model, the metacognitive tenet, that clearly describes the theorized link between too much self-reflection and lower well-being. Although the study has been excluded due to not including typically developing children, the description is valuable and missing in the included studies. Hopefully it aids a further understanding of the relationship between reflecting and well-being:

> [T]he metacognitive tenet (Wells and Matthews, 1996) emphasizes the role of metacognitions in almost all psychological problems (for a review, see Wells, 2013). According to this model, psychological problems are exacerbated and maintained by maladaptive styles of coping with thoughts and emotions, such as perseverative thinking like worry and rumination, monitoring, and thought suppression. These coping styles are derived from underlying metacognitions, which have been defined as "the information individuals hold about their own cognition and internal states, and about coping strategies that impact both" (Wells, 2000, p. 65)

In this section such positive and negative relationships between reflection and well-being will be described. In an empirical study, Burwell and Shirk (2007) studied the relationship between rumination and depression in early adolescence. Their hypothesis was that rumination includes adaptive and maladaptive forms. An adaptive form of rumination is self-reflection "or actively attempting to gain insight into problems" (p. 56), whereas a maladaptive form is brooding "or passively focusing on symptoms" without taking action to change the situation (p. 56). In earlier studies, brooding predicted depression but self-reflection did not. Moreover, previous studies demonstrated how self-reflecting on negative emotions, in contrast to warding negative emotions off, provided increased self-awareness and emotional clarity. Burwell and Shirk's (2007) study was conducted in a public school context in the United States. In their sample, they found rumination in both forms: brooding and self-reflection. Moreover, in the 168 included children aged 12 to 15 years, brooding was related to depression while self-reflection was not. Reflection was even linked to positive outcomes, such as problem-solving and emotional intelligence. The researchers suggested that there may be further possible relationships between reflection and goal clarification in the problem-solving process, but these are not supported with evidence yet. From their study, the researchers concluded that:

> [The] results indicate that it is the manner by which negative emotions are addressed that is critical. Passively experiencing and brooding about negative emotional states may undermine active attempts to cope with or resolve problematic emotional situations. However, active reflection on the causes and consequences of negative emotions appears to be associated with active problem solving and may be the foundation on which effective problem solutions are based. In this connection, active emotional reflection appears to share some properties with other emerging interventions for emotion regulation. (p. 64)

Bohanek and Fivush (2010) studied autobiographical narratives from adolescents in the United States aged 13 to 16 years. They looked for indications of emotional well-being by how personal experiences were narrated. They built on previous studies which demonstrated a positive link between internal state language in personal narratives and well-being in adult populations. The authors explored sex differences in adolescents' personal autobiographical narratives and found a sex difference in the use of self-reflective language:

> [F]emales narrated both positive and negative personal experiences in more emotional ways. Also, females included more cognitive processing words indicative of self-reflection. Relations to well-being were also gendered. Adolescent males who told personal narratives richer in internal state language displayed higher levels of well-being, but there were no relations between internal state language in personal narratives and well-being for adolescent females. (p. 368)

White et al. (2015) studied how self-distancing can promote adaptive self-reflection. They examined how adolescents recount an experience that angered them, how they talked about it (from their own or an observer's perspective), and how this related to their experienced emotions and after-thoughts about the experience. They concluded that adolescents naturally self-distanced and that the more they self-distanced during reflecting, the less upset they felt. In this way, self-distancing enabled adaptive self-reflection rather than maladaptive reflection. Moreover, older participants were generally more capable of self-distancing. The researchers clearly assumed a difference between adaptive and maladaptive self-reflection, which was not further explained.

Other studies focused on negative effects of related constructs, such as self-rumination. For instance, Pena and Losada (2017) focused on self-rumination, self-reflection, test anxiety and emotions among public school students in Madrid and Toledo, Spain. The defined self-rumination as "recurrent negative thinking" (p. 4). They found that self-rumination mediated the relationship between emotional attention and test anxiety while self-reflection did not. People with higher self-rumination had higher test anxiety. In a literature review, Faedda et al. (2017) discussed the relationship between maladaptive metacognitive patterns of thinking with headache and migraine, a significant health problem in children and adolescents (p. 1). They built on other studies which found relationships between metacognitive skills and "anxiety, depression, motivation, academic performance, human social interactions and stress symptoms" (p. 1). In their review, they used metacognition as a synonym of "mentalization [including theory of mind (ToM)]" (p. 2). They hypothesized that: "headache and these comorbidities, in particular anxiety and depression, may have in common persistent and maladaptive patterns of thinking which are related to maladaptive metacognitive beliefs" (p. 1). They additionally suggested that metacognitive strategies and mindfulness practice in children and adolescents could prevent headache and migraine and further complications. These suggested relationships were not supported by empirical evidence, and the authors concluded that further empirical evidence is needed in this field.

4.7. Reflecting as a core capacity

When searching the key terms in combination with *core capacity,* ERIC gave some seemingly relevant results, including two studies mentioning *core competences* explicitly. However, in EBSCO there were no results at all which is a unique finding for the *reflection* searches so far. In PubMed there were few results for *metacognition* and *core capacity*, no results for *self-reflection* and *core capacity* and only a few possibly relevant results for *reflection* and *core capacity*. Overall, the 16 abstracts resulting from these extra searches were all excluded.

Various included studies from the general searches, contained the term 'capacity' or another related concept. However, there was not always a relevant link to the L4WB hypothesis. Simply describing self-reflection or metacognition as a 'capacity' did not usually embody the meaning which L4WB ascribes to a core capacity.

The description of "core metacognition" might be the most important finding in relation to the concept of core capacity as proposed by L4WB. In a literature review, Goupil and Kouider (2019) built upon, among others, Louca-Papaleontiou (2019) to suggest an understanding of metacognition as a "core system". While various studies are included as an evidence base in their literature review, no further empirical evidence supports their theory at this stage. They referred to how other "flexible and explicit capacities" are based upon metacognition as part of the core system.

> [W]e here propose that starting in the first years of life, humans are already endowed with a system of core metacognition allowing them to automatically evaluate and regulate their own cognition. Core metacognition is complementary to other core systems that evolved to fulfil a dedicated function (e.g., representing objects) and on which flexible and explicit capacities build later in development (Carey, 2009; Spelke and Kinzler, 2007) (…) As with other core systems, core metacognition can be considered an innate component relying on the maturation of dedicated brain structures that were shaped by evolution to constrain and optimize our representational space. (…)Thus, although the structures that support core metacognition are already functional during the first years of life, they remain largely immature and undergo substantial development throughout childhood. So far, the youngest age at which core metacognition has been observed is 12 months (Goupil and Kouider, 2016). (p. 3)

Geurten and Bastin (2018) designed an empirical study to test the existence of this implicit core metacognition in children. They found it to exist in children aged 2.5 years.

Various included studies linked reflecting to life skills. Robson (2016b) differentiated between children's display of self-regulation and metacognition, calling both "vital life skills for children and adults" (p. 1). Moreover, Louca-Papaleontiou (2019) conceptualized metacognitive awareness as "a crucial learning skill" (p. 57). Similarly, Dörr and Perels (2019) referred to metacognitive skills.

4.8. Reflecting and its physical, emotional, mental and spiritual dimensions

Studies included in this paper have been categorized by using the matrix of L4WB's four perspectives (Table 1).

From the applied matrix, most studies fall within the mental and emotional categories towards the content and process levels of the continuum. No study was identified that could be classified towards the end of the continuum, at the level of intention. The clearest pattern seems to be that the majority of studies focused on the emotional process level (such as how relationships influence the capacity in children) and the mental content level (such as whether young children use metacognition or reflection). With these limited results for spirituality, a further search into reflection and spirituality was conducted which did not result in any further included studies.

Overall, the literature informs the L4WB hypothesis to varying degrees. Some categories are well represented with empirical data (such as the mental and emotional categories and their content and process). Other categories are hardly supported in the literature identified in this mapping (such as the physical category and the spiritual category at the end of the continuum).

The L4WB theoretical framework is built on a broad interpretation of the mental, emotional and physical categories which makes many studies fit the matrix when applying it. If other understandings of these categories had been applied, fewer studies would have fitted the matrix. For instance, the emotional category is understood to include relationships beyond individual feelings, and the physical category includes the material environment beyond the individual actions performed. If only the studies on individual feelings or actions had been included there would have been significantly fewer studies in Table 5. It would show that these fields are less studied and empirically substantiated as they may seem now. This would have especially affected the emotional process and physical process categories.

Table 5: All studies in the Matrix of Four Perspectives

	content 'what'	process 'how'	SPIRITUAL (S) intention 'why'
MENTAL (M)	8 studies[1]	7 studies[2]	0 studies
EMOTIONAL (E)	3 studies[3]	10 studies[4]	
PHYSICAL (P)	1 study[5]	2 studies[6]	

Note. Not included: 2 studies.[7]

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1   The eight studies placed at the Mental (M) content level are: Bohanek and Fivush, 2010; Burwell and Shirk, 2007; Dent and Koenka, 2016; Goupil and Kouider, 2019; Gharial et al., 2017; Louca-Papaleontiou, 2019; Vaccaro and Fleming, 2018; Zohar and Barzilai, 2013.

2   The seven studies placed at the Mental (M) process level are: Burwell and Shirk, 2007; Dörr and Perels, 2019; Geurten and Bastin, 2019; Hsieh et al., 2013; Lewis, 2017; Salmon, 2016; van der Walt et al., 2008.

3   The three studies placed at the Emotional (E) content level are: Bohanek and Fivush, 2010; Pena and Losada, 2017; Tornare et al., 2015.

4   The 10 studies placed at the Emotional (E) process level are: Cooke et al., 2017; Dörr and Perels, 2019; Esbjørn et al., 2016; Larkin, 2009; Robson, 2015; Robson, 2016b; Thomas and Anderson, 2013; Thompson and Foster, 2013; Veas et al., 2018; White et al., 2015.

5   The one study placed at the Physical (P) content level is: Vaccaro and Fleming, 2018.

6   The two studies placed at the Physical (P) process level are: Álvarez-bueno et al., 2017; Faedda et al., 2017.

7   The two studies not included in the matrix are: Gascoine et al., 2016; Robson, 2016a.

5. DISCUSSION

In this mapping paper, empirical and theoretical evidence of the development of 'reflecting' in children and its relationship to well-being were explored. There was no clear evidence of 'reflecting' as a core capacity, while the search term 'metacognition' gave various relevant results. Conceptual findings and developmental findings were few for reflecting, while more empirical and theoretical insights appeared for metacognition. This paper included explicit searches with the search terms 'core capacity'. These searches did not result in any relevant studies included. It is recommended that in the other papers, no searches are needed with the terms 'core capacities'.

Conceptually, the results on the literature on reflecting are complicated. A straightforward stream of literature that purely focuses on how reflecting develops in children is lacking. This result was found despite searches of studies with the key terms 'reflecting' and 'self-reflecting'. Despite these explicit searches for studies using 'reflecting', very few results were obtained. No clear theoretical or empirical evidence base of reflecting as a core capacity were found. Early definitions of metacognition demonstrated that metacognition consists of multiple concepts, including both cognitive and affective states. The construct of 'reflecting' should clarify which constructs of metacognition are included or excluded. This demarcation determines the evidence base to draw upon. Various further theoretical foundations for reflecting could be explored such as Dewey (1933), Habermas (1986), Mezirow (1990), or Moon (2004). Moreover, studies on reflecting based on adult participants may offer additional insight for further developing the *reflecting* core capacity.

The results from the key terms for this paper were vast. Initially, 269 abstracts were selected for this paper. The core capacity 'reflecting' is broad, and other related concepts appeared from the studies. Concepts that seem to be strongly overlapping with the proposed 'reflecting' core capacity included: theory of mind, mentalizing and introspection. Other related concepts included: self-regulation, metacognitive monitoring, executive functioning, mindfulness, self-consciousness, and self-rumination. This mapping shows that the concept of the core capacity 'reflecting' can be further developed or narrowed down.

While considering the initial L4WB definitions for reflecting, a few insights stand out. Initially, L4WB described reflecting as a conscious and a metacognitive activity. The further conceptualization based on the four perspectives broadened the initial L4WB definition for reflecting (Table 1). The initial definition was expanded to areas that are not conscious. While it is possible to reflect on emotions, relationships, physical or spiritual experiences, the activity of reflecting itself does not necessarily change. The broader definitions in Table 1 were not further supported with empirical or theoretical evidence. However, due to broad definitions of the emotional and physical levels, it seems as if these levels were supported with included studies. This generally proved not to be the case since most studies in these levels considered the social and physical environments in which reflecting took place. The reflecting definitions based on the four perspectives may be too broad to pin down the core capacity of reflecting conceptually. One of the reviewers suggested defining reflection as "thinking about experiences (rather than thinking about thinking) including recalling, making sense, making meaning" (M. Rawson, personal communication, 11 September 2020). On the other hand, this would exclude most findings on metacognition. The spiritual dimension is related to mindfulness, which was discussed in connection with relaxation.

The placement of studies in the matrix showed that the emotional process level included most studies. This level mainly included studies on metacognition and social relationships. Many studies considered the role of a parent or caregiver on the development of a child's metacognition. If the emotional category were defined more strictly, these studies would not have fitted within the matrix. Not all relationships need to be emotional on the individual child level. The framework needs to address the place of the social and environmental context of the child. Currently, the four perspectives do not allow for studies studies to be placed on the social and physical environment of the child in the framework. Other L4WB conceptualizations and models acknowledged the child's social context and environment. For instance, the living systems perspectives included 'self', 'others', and 'environment' (Kickbush, 2012, p. 29).

No results looked purely at the development of reflection or self-reflection during childhood. When searching for the development of metacognition, many studies appeared. Over the past few years, authors have written on the presence of metacognition in very young children. Traditionally, metacognition was believed to develop later during childhood. Some recent authors argue in their literature reviews for the existence of core metacognition early in life (Goupil and Kouider, 2019; Louca-Papaleontiou, 2019). This concept of core metacognition was confirmed by an empirical study with children implicitly introspecting at an age as young as 2.5 years (Geurten and Bastin, 2018). The core metacognition studies form a relevant stream of literature to explore further for the L4WB hypothesis that considers 'reflecting' as a core capacity. However, these studies appeared from the 'metacognition' searches, and such studies did not appear from the 'reflecting' searches. Overall, almost as many reviews and meta-analyses (three studies) are included compared to empirical studies testing the metacognitive development in children (four studies). Compared to papers on the other core capacities, this paper did not reveal a clear empirical literature stream on the development of 'reflecting' throughout childhood. No clear developmental pattern of 'reflecting' or 'metacognition' was found in any studies or reviews. Thus, the literature has a gap on studies examining the development of 'reflecting' throughout childhood.

Within formal education settings, the majority of the included studies focused on metacognition and individual academic performance. In some studies, metacognition is positively related to academic achievement. Other studies examine how metacognition can be developed further through education (and presume that metacognition should be further stimulated in education). A minority of studies explored the importance of social interactions for metacognition in the classroom, both with peers and significant adults, and the relationship between metacognition and emotions.

Overall, the various studies that linked self-reflection or metacognition to well-being included both potential negative and positive effects. This suggests that it is not so much the activity of self-reflecting or thinking about thinking that would lead to positive results but rather the right type and amount of self-reflection and thinking about thinking. From the studies included in this paper, there is no empirical evidence of the effects of reflection and metacognition on well-being before the age of 12 years. For the reflecting capacity, considering studies solely on adults could be relevant for understanding the capacity further. This counts especially for the relationship between reflecting and well-being, where some relevant studies on adults included topics such as shame, self-reflections, sense of agency, resilience and socio-emotional well-being. These concepts can be studied further empirically in children. Moreover, the ways in which reflecting can stimulate well-being can be studied further, especially in ways that can be implemented in education and beyond. These suggestions about the link between reflecting and well-being have important implications for promoting reflecting as a core capacity. This should not be done without specifying exactly the type of reflecting stimulated in

children and adolescents in order to prevent possible negative effects on child well-being. A possible approach for identifying the link between reflecting and well-being could be a salutogenic approach (Mittelmark et al., 2017).

Reflecting overlaps in direct and indirect ways with various other core capacities identified in the L4WB framework. A conceptual overlap with mindfulness was found, which was purposefully excluded from this review because the 'relaxing paper' covers mindfulness. Several studies included links with empathy. Conceptually, reflection has been linked to self-awareness as the source of self-conscious emotions, including empathy (Lewis, 2017). Reflection is connected to the suggested core system of metacognition, which would be essential for empathy (Goupil and Kouider, 2019). Moreover, self-reflection is related to theory of mind, which includes reflecting upon somebody else's thoughts and thus can be considered for empathy (Louca-Papaleontiou, 2019).

5.1 Limitations

This mapping paper has several limitations. This study is an exploratory study that aimed to review a large body of academic literature. Due to the scope of the paper and the large body of academic literature, the review could not be exhaustive. Numerous related concepts to '*reflecting*' appeared at different stages in the writing of this paper. Not all concepts could be taken into consideration. Another limitation is that the study did not systematically aim to find how '*reflecting*' is not a core capacity for well-being. Due to strict inclusion criteria, only studies on typically developing children were included. Many children remain unrepresented, and various relevant studies and findings may have been left unexplored. The evidence base of this review was limited mainly to studies from Europe and North America and studies solely written in English. Therefore, the review paper is based on a limited evidence base. Further diversity, including cultural differences and sex differences, was largely omitted in the included studies. Further reviews on core capacities in children should aim to find ways to explore the child population in all its diversity.

In combination with exploring the existence and impact of eight other possible core capacities for well-being, this study aims to contribute to the understanding of core capacities possibly benefiting child well-being.

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APPENDIX A: LISTS OF KEY TERMS

List 1 terms related to core capacity

Self-Reflection
Metacognition

List 2 terms related to population

Children
Adolescents

List 3 terms related to research focus (OPTIONAL)

BLANK
Development
Well-Being
Life skill

APPENDIX B: QUALITY INCLUSION CRITERIA

	Criteria	Sub-categories	Description
1	What does it mean for a study to be **Conceptually Coherent**?	Introduction	Topic, purpose, and study rationale are clearly stated.
		Literature Review	The relevant conceptual underpinnings of the issue are fully explained.
		Research questions	Research questions and/or hypotheses are well defined and drawn from sound evidence-based theoretical or conceptual framework.
2	What does it mean for a study to use **Appropriate Methods**?	Methods	The research design and sampling are appropriate for the study. The study includes a well-articulated rationale.
		Theory (especially for studies with a primary theoretical framework)	A sound and established theoretical line is present.
		Data	Relevant data have been employed. Where survey data are used, the sample is well described and clearly appropriate for the task at hand.
		Analyses	The procedures and measures have been selected correctly and applied correctly.
3	What does it mean for a study to be **Scientifically Valid**?	Results	The results of the statistical/empirical tests are fully and correctly interpreted. Basic statistical information, such as probability stats, sample sizes, etc., and coherent explanation of findings are included – avoids overstating the study's importance and generalizability.
4	**Ethics (important but not a requirement to be accepted**)	Ethical review	If the research involves primary data collection and/or the use of sensitive secondary data, ethical considerations are described in the study. For example, the article might include details of the procedures followed to ensure the ethical review of data, an indication that the study received the proper oversight from review board or any mitigation strategies.

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