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## Creativity Research Overlooks the Study of Resilience among Young Children: A Bibliometric Network Review

### ABSTRACT

Creativity researchers are increasingly interested in understanding when, how, and for whom creativity can be beneficial. Previous reviews have demonstrated that creativity research largely ignores the study of its impact on factors that promote health, and well-being among populations of adults. It is unclear, in fact, whether this gap in research also extends to creativity research among young children. This paper addresses this issue. Early childhood is a crucial stage for the cognitive development of young children who remain highly sensitive to stress, and adversity. It is therefore essential to identify and promote factors that are beneficial to early childhood resilience, thereby contributing to documenting more of the effects of creative activities on positive outcomes. This paper presents a review with a bibliometric analysis of 1000 randomly selected articles from the Web of Science, without bias towards any specific peer-reviewed journal. The analysis of 454 included articles shows that approximately 80% of the included studies focus on creativity as an outcome (replicating previous findings with a larger sample), with only 3.78% investigating creative activities as predictors among young children. In this small percentage, most of the studies addressed creative activities in young children related to resilience outcomes.

**Keywords:** bibliometrics, bibliometric network review, early childhood, preschool, creativity, creative activities, resilience.

Creativity researchers are becoming increasingly interested in understanding not only *whether* creativity is important, but *when, how, and for whom* (Conner, DeYoung, & Silvia, 2018; Forgeard, 2015; Forgeard & Kaufman, 2016). Since Forgeard and Kaufman's (2016) review showed that creativity research was more inclined to study how to promote creative thinking and/or behavior rather than asking why these were important in the first place, the field has pursued efforts to document the benefits of creative activities on mental health. Creative activities refer to activities that significantly involve imagination, such as painting, drawing, or pretend play (Hansen, Erlandsson, & Leufstadius, 2021; Perruzza & Kinsella, 2010). They generally correspond to the Little-*c*/everyday level of creativity, i.e. the level at which an individual can produce products, ideas and solutions that are meaningful to them, but not necessarily exceptional (Diedrich et al., 2018; Kaufman & Beghetto, 2009).

Perhaps unsurprisingly, one of the few fields that has approached creative activities as a tool by which to promote positive outcomes has been clinical science—notably art therapy (Fancourt, Garnett, Spiro, West & Müllensiefen, 2019; Forgeard & Elstein, 2014; Gavron & Mayselless, 2018; Thayer & Bloomfield, 2021; Verger, Shankland & Sudres, 2022). One of the most replicated findings in the field is that creative activities tend to foster positive emotions, thereby contributing to individual wellbeing (Cheung et al., 2019; Conner et al., 2018; Gavron & Mayselless, 2018; Karwowski et al., 2021). In that sense, growing evidence documents the therapeutic effects of creative activities in clinical settings as a tool for resilience promotion (Forgeard, 2019; Forgeard & Elstein, 2014).

The main goal of resilience research is to understand and intervene in the individual and socio-cultural factors that can enable children to rebound and thrive in the face of adverse conditions (Masten, Lucke, Nelson, & Stallworthy, 2021; Ungar, 2018). In this article, we use Masten et al.'s (2021, p. 524) unified definition of resilience as:

...the capacity of a dynamic system to adapt successfully through multisystem processes to challenges that threaten the function, survival, or development of the system.

The concept of resilience is embedded into developmental systems theory, which posits that the current state of a child as well as their trajectory towards a future state are shaped by reciprocal interactions, and coactions of multiple arrays of systems (Bronfenbrenner & Morris, 2006; Masten & Barnes, 2018; Ungar & Theron, 2019). Resilience thus depends on the child's interactions with various factors – from biological to psychological, and from individual to interpersonal systems, to cultural systems (Kalisch et al., 2017; Masten & Barnes, 2018; Ungar & Theron, 2019).

In line with this systematic approach, creativity research has more recently stressed the important role of parents as a fundamental influence that can promote creative behavior among their children (Kupers, Lehmann-Wermser, McPherson, & van Geert, 2019; Kwaśniewska, 2019). The theoretical framework of children's creativity, developed by Kupers et al. (2019) conceptualizes children's creativity through the triadic interaction between (a) the child, (b) the parent or teacher, and (c) the task/activity at hand. In this model, creative activities are understood at different behavioral levels that are connected by processes of emergence and constraint, and that take place in moment-to-moment interactions.

Kupers et al. (2019) model posits that the creativity task is iterative: each state of interaction between the child, their parent, and the environment is dependent upon previous interactions. The state of the system is therefore dependent upon both the previous short- and long-term so-called "histories" of the system. The products that the child creates act as a constraint for subsequent interactions during the creative activity. Similarly, the child–parent/teacher–environment interactions allow the emergence of products that act as a constraint for subsequent interactions during the creative activity. These products may be labeled "creative" by teachers, parents, or, more broadly, their peers. In that sense, the products that the child creates are embedded into socio-cultural evaluations, norms, and consensual beliefs about creativity: the parent/teacher—child dyads thus evolve through multiple proximal and distal systems (Bronfenbrenner & Morris, 2006). This theoretical framework pictures children's creativity as inherently multisystemic and influencing similar factors as is documented in resilience research (Masten et al., 2021).

Resilience, indeed, can be examined from different angles: as a trait, a process, or an outcome, each encompassing three primary domains—individual factors, interpersonal factors, and community factors (Masten et al., 2021; Ungar, 2018). These domains are interconnected and multilayered (Ungar & Theron, 2019).

When approached as a trait, resilience research seeks to pinpoint the inherent personal attributes that enable a child to adapt and display competence and flourishing in challenging circumstances (Garmezy, 1974; Masten, 2001). Viewed as a process, resilience research strives to comprehend the diverse methods, mechanisms, and factors that contribute to a child's capacity for positive adjustment when faced with adversity. As an outcome, researchers explore how well a child navigates developmental milestones and performs in various domains while confronting adversity (Brownlee et al., 2013). This can manifest through minimal symptom expression or demonstrated competence in crucial areas of their growth (Masten, 2013; Masten & Cicchetti, 2012).

As the following subsection shows, to date creativity researchers have mainly focused on adult resilience, and seemed to have barely addressed whether creative activities can contribute to early childhood resilience (Verger, Roberts, Guiller & McAloney-Kocaman, 2023). The aim of this article was, therefore, to document the extent to which creativity research focuses on early childhood resilience, and to examine the evidence for a link between creative activities and resilience in children aged 3–6. After a brief section presenting research findings on the positive effect of creative activities on adult resilience, a second section of this article highlights the lack of research on the early childhood population. In this context, the article presents the rationale behind the bibliometric analysis conducted as part of this study.

#### THE POSITIVE EFFECTS OF CREATIVE ACTIVITIES ON ADULT'S RESILIENCE

Research shows positive effects of creative activities as a potential source of resilience. For example, engaging in creative activities appears to help adults diagnosed with cancer cope with moderate to severe symptoms of anxiety, depression and fatigue (Jiang et al., 2020; Tang et al., 2019; Xu et al., 2020). Creative activities also tend to reduce positive symptomatology in adults with schizophrenic disorders (Laws & Conway, 2019). Similarly, they appear to help the older population moderately prevent cognitive decline,

depressive symptoms and anxiety (Masika, Yu, & Li, 2020). This line of research mirrors other findings showing that dramatic interventions tend to promote active coping with stress in adults (Sappa & Barabasch, 2020).

What is more, data collected during the COVID-19 pandemic showed that creative thinking helped adults protect themselves from the negative impact of the pandemic, a process in which they constructed meaning as they engaged in solving the challenges posed by this global context (Kapoor & Kaufman, 2020). For example, adults in Argentina were more likely to engage in creative activities such as cooking, painting and drawing than in other activities (such as reading or playing sports) during lockdowns (Elisondo, 2021). Similarly, another recent study found that adults in Poland reported that creative activities contributed moderately to their positive emotions during lockdown (Karwowski et al., 2021). In cross-cultural comparisons of different adult populations (in Israel, the United States, Italy and China), creative behavior was positively and strongly associated with resilient coping (the ability to adapt positively to stress and perceive oneself as having some degree of personal control to cope with difficult situations and thrive), which predicted emotional well-being in all four countries (Orkibi et al., 2021).

Thus, research is increasingly documenting the extent to which creative activities can contribute to adults' resilience – yet, their benefits among children, and young children more specifically, remain underexplored.

#### A NEED TO STUDY THE EFFECTS OF CREATIVE ACTIVITIES IN EARLY CHILDHOOD RESILIENCE

Early childhood, spanning from ages 0 to 5, is important in shaping a child's adaptive mechanisms centered on stress regulation, emotion regulation, and self-regulation (Masten, 2013; Masten & Barnes, 2018; Yates, Tyrrell, & Masten, 2015). During these years, a child's brain exhibits remarkable plasticity and susceptibility to early stressors. Adverse experiences during this period can cast long-lasting and detrimental effects on an individual's mental wellbeing and overall health throughout their entire lifespan (Broekman, 2011; Hughes et al., 2017; Nurius, Green, Logan-Greene, & Borja, 2015). This makes these years crucial to equip young children with the necessary skills both to manage and flourish with (and without) confronting elevated stress levels.

Recent discussions within the field of creativity research have proposed that engaging in creative activities might yield positive effects on the attributes that bolster the resilience of young children (Forgeard, 2018; Verger, Urbanowicz, Shankland, & McAloney-Kocaman, 2021; Verger et al., 2023). To some degree, previous research aligns with this idea. For example, Yates and Marcelo (2014) discovered a moderate and favorable correlation between pretend play and ego-resiliency—a mindset linked to resilience—showcasing a child's adaptable, inhibitory, and flexible behaviors (Block & Block, 1980). Additional studies have also upheld a favorable correlation between creative activities and certain resilience outcomes, such as diminishing aggressive behaviors (Korošec & Zorec, 2020).

Furthermore, research has highlighted how creative activities can aid individuals in managing and regulating challenging emotions (Brown, 2007; Loizou & Loizou, 2019). Likewise, the impacts of art-based programs on the autonomy, self-efficacy, and positive emotions of 4- and 5-year-old children have been identified—these factors stand as promotive elements of resilience and are integral outcomes of resilience itself (Aubrey & Dahl, 2013; Deci et al., 2001; Fernandez-Santin & Feliu-Torruella, 2020; Kondo, 2020; Masten & Barnes, 2018; Montgomery, Miller, Foss, Tallakson, & Howard, 2017). Yet, despite these insights, the existing literature has lacked a comprehensive synthesis that substantiates our understanding of whether, and potentially which, creative activities contribute to the factors that enhance the resilience of young children.

#### THE PRESENT REVIEW

Prior to this bibliometric review, little evidence has been produced to indicate whether, when, and how creative activities can contribute to young children's resilience. Indeed, creativity researchers have only recently begun to ask whether creativity might serve resilience, and had previously studied this question almost exclusively within adult populations (Forgeard, 2015, 2018; Forgeard & Elstein, 2014). Over the 200 studies included in their review, Forgeard and Kaufman (2016) found that only 12 (i.e., 6%) addressed processes or outcomes that could relate to resilience as proxied through domains including health, wellbeing, and problem-solving. Unfortunately, beyond these general labels, their study did not report details about which specific outcomes these 12 studies addressed, nor state how many samples of young children were represented in the review.

The goal of this bibliometric review was to conduct a literature review using a bibliometric analysis on the extent to which creative activities contribute to resilience-related processes and outcomes. More specifically, this review aimed to answer the following three questions:

1. Do creative activities contribute to young children's resilience?
2. What percentage of studies focuses on young children as the research sample?
3. What percentage of research addresses creativity/creative activities as an independent variable among populations of young children?

## METHODS

### RESILIENCE FACTORS

Given the multidimensional nature of resilience as a construct, the present review used Masten and Barnes (2018) shortlist to retrieve publications in creativity research that studied resilience factors. We selected this shortlist as it summarizes the main findings of decades of research about the factors that contribute to resilience (Masten et al., 2021). These factors were as follows: agency, coping abilities, sense of mastery, problem-solving skills, executive function skill, self-regulation, emotion regulation, self-efficacy, positive self-views, hope, faith, optimism, meaning making, and school readiness.

### DATABASE SEARCHING AND DATA COLLECTION

Figure 1 summarizes the data collection procedure. The study conducted bibliometric analysis using metadata retrieved from the *Web of Science* database which, due to its millions of records across fields in the social sciences, humanities, education, and the arts, is one of the most-used databases in bibliometrics (Mongeon & Paul-Hus, 2016). This review aimed at collecting a broad array of publications and, on 29 April 2020, searched all fields of the database using the broad keyword "ALL = (creativ\*)". It screened publications from between 1 January 1950 and 31 December 2020. The research team set 1950 as the start year because this tends to be considered as the first year of contemporary creativity research (Beghetto, Plucker, & MaKinster, 2001, p. 351; Guilford, 1950). The study set 31 December 2020 as the end year of the review to ensure the retrieval of a maximum number of publications that would appear as in *early view* on publishers' websites, which is a service that enables readers to access publications prior to their appearance in an issue of a publication. The research team used a very broad keyword to retrieve a maximum number of records that could then be used in the bibliometric analysis. This step retrieved 275,743 records. Next, inclusion criteria were applied. To be included, articles needed to be peer-reviewed studies, written in English or in French, as these were the two languages in which they were fluent. This retrieved a total of 143,458 items.

### BIBLIOMETRIC ANALYSIS

Bibliometric analysis allows large volumes of literature data to be mapped, to give an overview of a scientific field, identify knowledge gaps in that field, and help to understand any trends in, and shortcomings of, a research domain (Donthu, Kumar, Mukherjee, Pandey, & Lim, 2021).

Previous research has used bibliometric analysis to map the state of the creativity research through reporting the evolution of publication and citations, and mapping co-authorship (De-Marchis & Shchebetenko, 2022). In this review, bibliometric analysis was used with a different aim: to extract a large number of records and address the limitations of previous research (e.g., Forgeard & Kaufman, 2016) which based their reviews on a pre-set number of outlets. In other words, in this review, bibliometric analysis was not used to map the studies, but solely to extract data from the literature to limit selection bias.

### DATA REDUCTION AND BIBLIOMETRIC PROCEDURES

The study extracted a .csv file of metadata (i.e., full records and cited references) from the *Web of Science* of all 143,458 retrieved articles. Then, a bibliometric network analysis was conducted using VOSviewer software (Perianes-Rodriguez, Waltman, & van Eck, 2016; van Eck & Waltman, 2010). VOSviewer is a tool that enables the construction and visualization of bibliometric networks that can be constructed based on citations, bibliographic coupling, co-authorship relations, or co-citations. It has already been used in previous bibliometric research on creativity (De-Marchis & Shchebetenko, 2022; Yang, Gebbing, Lankut & Lattemann, 2023). From *Web of Science's* publication the research team created a bibliometric network based on the articles the previous authors had retrieved *via* their search strategy. To further reduce data and identify

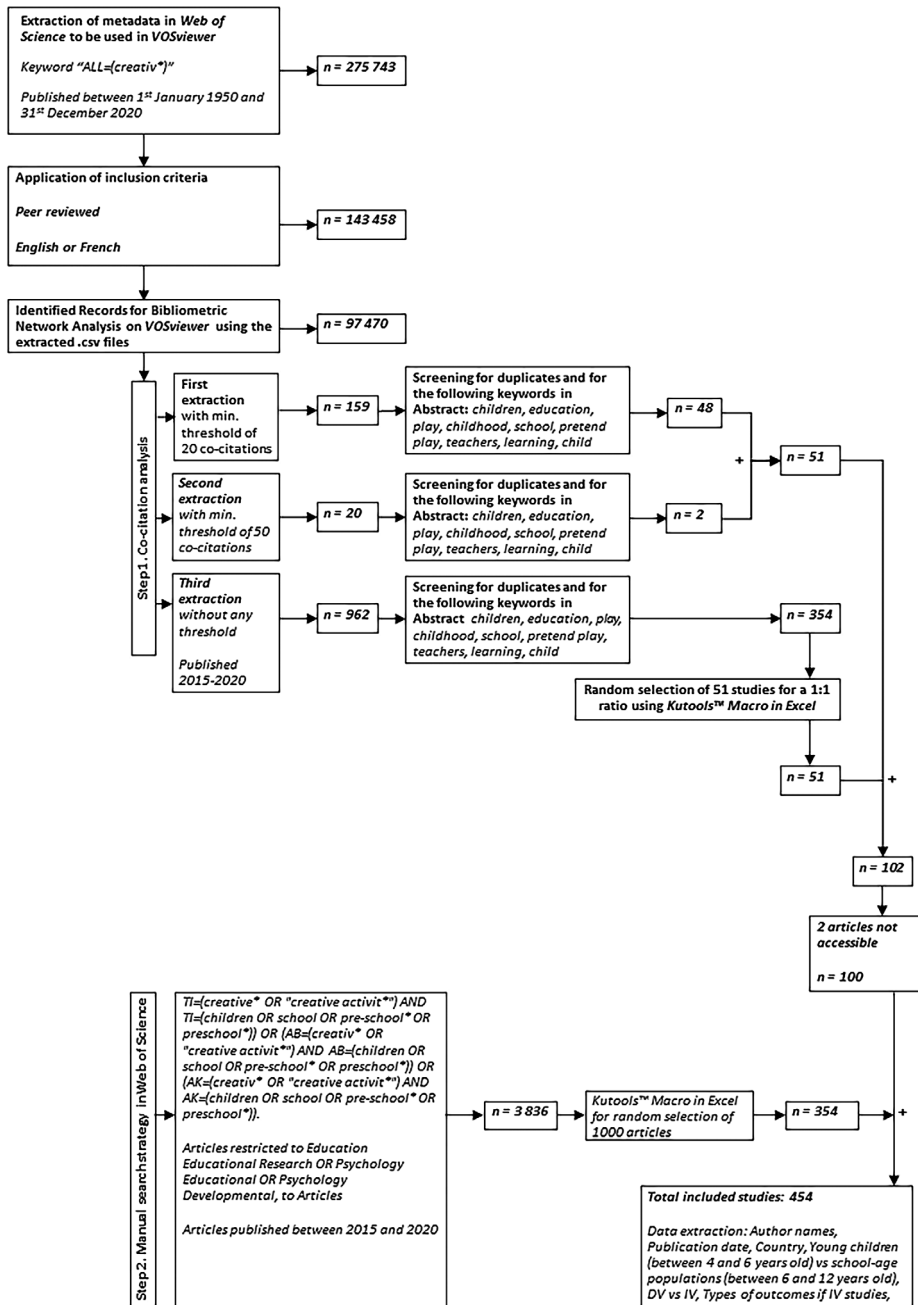


FIGURE 1. Search strategy for this review.

the most important studies on creativity and children, they adopted a two-step procedure which, to the best of their knowledge, had not been used prior to this study. This procedure aimed at minimizing methods-related biases by providing two means of data collection.

The first step of the procedure was based on co-citations and the retrieval of the most influential (i.e., cited) articles in creativity research in relation to children. There was a total of 97,470 eligible records for co-citation. Co-citations refer to the relatedness of articles based on the number of times these papers have been cited together in another publication: this is assumed to reflect the intellectual structure of a field based on the most influential (i.e., most-cited) papers (Donthu et al., 2021, p. 288). Co-citation thus appeared to be the best method to achieve the author's aim to understand how much creativity research has studied the effects of creative activities on young children's resilience. The second step aimed at collecting data using a traditional search strategy as a complement to the bibliometric co-citations analyses.

#### Step 1: co-citation analyses

First, the research team aimed at identifying articles based on co-citations with the goal of identifying the core papers in the bibliometric network. They set a threshold based on co-citations that would allow manageable data to be extracted for analysis. Following Boyack & Klavans (2010, p. 2394). They set a threshold of a minimum of 20 co-citations. This meant that the papers identified in the network had to have been cited together in at least 20 other articles. From the 97,470 eligible items, this procedure identified 159 papers. After screening for duplicates and for the keywords *children*, *education*, *play*, *childhood*, *school*, *teachers*, *learning*, and *child* in the articles' abstracts, this procedure uncovered 48 articles. To further identify the most important articles in the bibliometric network, the research team increased the threshold of co-citation, then set it to 50. They assumed that this would retrieve highly influential papers in the field. From the original 97,470 eligible items, this approach retrieved 20 items. After the same screening as in the first extraction, application of exclusion criteria, and removal of duplicates, two additional papers were identified, yielding a total of 51 articles.

At this stage, the literature that was identified was older, as most of the included papers that were identified through the two first extractions had been published in around 2000. This was predictable, given that these references were based on a minimum of co-citations. It may therefore be assumed that, due to the simple factor of time, older studies would be more likely to be much more frequently cited than more recent ones. Hence, in order to complement the data collection, and reduce any bias in the sample arising from the link between the date of publication and citations (older papers available being the most cited), the research team collected data from studies published between 2015 and 2020. They set no minimum threshold for the number of minimum citations, and this identified a total of 354 studies. To obtain a 1:1 ratio between the older studies (i.e., published between or around 2000) and the more recent ones, they randomly selected the number of studies identified through the two first extractions (i.e., 51) using a randomization macro spreadsheet. As such, the research team randomly selected 51 articles from these 354 articles; however, two articles were not accessible to read in full text. This missing data might have held relevant information about the state of creativity research, so in exercising caution, they decided not to proceed with another round of randomization. Thus, the total number of articles included from this procedure was 100.

#### Step 2: Traditional search strategy and randomization procedure

The second step consisted of a more traditional literature search to complement the bibliometric analyses. The research team conducted a second search of *Web of Science* on 4 November 2021 using the following search strategy: (TI = (creative\* OR "creative activit\*") AND TI = (children OR school OR pre-school\* OR preschool\*)) OR (AB = (creativ\* OR "creative activit\*") AND AB = (children OR school OR pre-school\* OR preschool\*)) OR (AK = (creativ\* OR "creative activit\*") AND AK = (children OR school OR pre-school\* OR preschool\*)). This search yielded 9,254 results. After restricting these articles to Education Educational Research OR Psychology Educational OR Psychology Developmental and to English/French languages, this search yielded 3,836 articles. Using the *Kutools*<sup>TM</sup> Macro in Excel, the research team randomly selected 1000 articles in order to constitute a representative subset of data. Screening the studies based on the inclusion criteria led to the inclusion of 354 other studies. This two-step search process resulted in a total of 454 studies being retrieved.

#### DATA EXTRACTION

From this total of 454 studies, the research team extracted the following data: Author names, publication date, the country in which the university that conducted the study was located; whether it addressed young children (between 4 and 6 years old) vs school-age populations (between 6 and 12 years old), whether the study focused on creativity as DV/IV, and (when applicable) what types of outcomes it focused on.

## RESULTS

## DO CREATIVE ACTIVITIES CONTRIBUTE TO THE RESILIENCE OF YOUNG CHILDREN?

## Evidence from intra-personal skills

The articles retrieved in this review show that creative activities contribute to positive early childhood outcomes as documented factors of resilience (Masten & Barnes, 2018). First, it appears that creative activities that are monitored by a professional artist can contribute to the development of intrapersonal skills among 4- to 5-year-olds, such as autonomy, and initiative-taking (Aubrey & Dahl, 2013).<sup>1</sup> Kondo (2020) for instance, reported the benefit of a 13-week piano lessons program on young children's autonomy, and feeling of self-efficacy. Likewise, other domains of creativity, such as visual arts, music, dance, seem to provide both a sense of enjoyment and autonomy among 2 year-old children (Fernandez-Santin & Feliu-Torruella, 2020). In that sense, Zafropoulou and Thanou (2007) found that a 14-session program based on activities such as pretend play, drama, puppets, story-telling, drawing, music, and divergent thinking showed medium effect sizes on five- and six-year-olds' emotion identification and positive thought content about one's mastery/competence abilities.

There is further evidence that creative activities help young children to develop their performance and abilities. Tsapakidou, Zachopoulou, and Zographou (2001) have shown that music promotes the development of motor performance in four- to six-year-olds, who learn to develop spatial awareness, motor inhibition, rhythmic coordination and synchronization. Creative activities seem also to be related to self-regulation and emotion regulation abilities. For instance, pretend play is positively associated with both divergent thinking and emotion regulation but not with executive functions (Hoffmann & Russ, 2012). While the study by Hoffmann and Russ (2012) suggests that pretend play does not correlate with executive/cognitive functions such as inhibition, which is important for self-regulation (Diamond, 2006; Diamond & Lee, 2011), other areas of creativity show some evidence of effects. Thayer and Bloomfield (2021), for instance, reported that a weekly practice of music, drawing, and dancing activities in a therapeutic context improved the young children's shared attention, social problem-solving, and self-regulation abilities.

These studies are in line with case study research documenting the benefits of creative activities as a means of managing and expressing difficult emotions. For example, in the intervention she conducted with a four-year-old child, Brown (2007) found that the child seemed to benefit from the use of activities such as drawing, painting, and collage to cope with the death of her brother and make sense of his loss. In the same study, Brown reported how a six-year-old used drawing to express her emotions about her leukemia, and facilitated discussions about illness and death with the medical team. This aspect leads us to the next subsection on the effects of creative activities on interpersonal aspects.

## Evidence from inter-personal skills

Creative activities can result in products that young children can display to harvest praise from family members (Fernandez-Santin & Feliu-Torruella, 2020). In addition to inter-individual factors, creative activities also appear to be profoundly relational, although, compared with intrapersonal skills, this bibliometric review retrieved fewer studies on those interpersonal aspects. First, there is evidence that creative activities such as drama or dance can be efficacious in promoting interpersonal skills such as empathy, emotion identification, and empathy (Payne & Costas, 2021; Trowsdale & Hayhow, 2015). According to Wright (2014), activities such as drawing are enjoyable ways of communicating that can help young children make sense of their surroundings. In this line, Loizou and Loizou (2019) described a case study of how two four-year-olds could use drawing and story creation to convey humor to others, when asked to comment on a text, and images.

Creative activities can also foster a sense of care for others. Montgomery et al. (2017) implemented a program that aimed at engaging kindergarteners in a 5-week art-creation project to raise money for charity purposes. As well as documenting how the children recognized that they lived in more privileged conditions than the children who they were aiming to raise money to buy books for, the authors identified the effects of the project on the kindergarteners' positive emotions, autonomy, sense of care, empathy, and meaning. Based on the children's verbatims, Montgomery and colleagues identified that the art-creation project fostered positive emotions during the creation process. According to the authors, by selling their creations to help disadvantaged communities to buy books, those young children also had the feeling of finding meaning in making the world a better place.

<sup>1</sup> Studies retrieved in this bibliometric review are indicated in the text by an asterisk.



#### Evidence from resilience outcomes: Internalizing and externalizing symptoms

Lack of resilience is characterized by the presence of problematic internalizing (e.g., withdrawal) and externalizing (e.g., aggressivity) symptoms (Masten & Barnes, 2018). In this sense, the present review has retrieved a number of studies that support the positive effects of certain creative activities on these symptoms in young children. Chi et al. (2016), for instance, indicated that some aspects of divergent thinking (ideational fluency) was negatively and moderately associated with internalizing symptoms and externalizing symptoms. Likewise, Korošec and Zorec (2020) contributed by showing the positive effects of a creative drama intervention using puppets on four- to seven-year-old children's externalizing symptoms. More specifically, these authors reported that the three-month interventions significantly reduced the occurrence of aggressive behaviors, particularly among children who scored very high on aggression before the intervention.

In contrast, however, Hektner, Brennan, and August (2017) reported no effect of creative activities on young children's externalizing symptoms. Indeed, in evaluating the efficacy of an intervention that incorporated painting, clay, drama, photography, music, dance, and cooking as creative activities, Hektner and colleagues reported that this six-week program did not show evidence of effects on kindergarteners' aggressive behaviors, although teachers tended to attribute higher social skills ratings to children who had followed the intervention. This suggests that factors other than areas of creative activity may moderate the relationship between these activities and externalizing symptoms. However, the author's articles provide little methodological information on what is meant by "the creative activities encouraged children to explore and develop interests in various art forms and nature" (Hektner et al., 2017, p. 71). It is therefore difficult to draw conclusions from this research.

#### Evidence from resilience outcomes: School readiness

School readiness can be considered an important aspect of young children's development, and a proxy for an important outcome of resilience: the ability to meet developmental goals in the presence of adversity (Masten & Barnes, 2018). This bibliometric review retrieved studies documenting evidence of the effect of pretend play on school readiness (Yates & Marcelo, 2014). But pretend play was not the only creative domain in which researchers have found positive associations with school readiness. In the study she conducted among "at-risk" young children, Brown, Benedett, and Armistead (2010) reported the efficacy of a 40-week art-enrichment program on language functioning. More specifically, and in comparison to those who did not follow the researchers' intervention, young children reported higher vocabulary scores after the intervention, to a medium extent.

#### WHAT PERCENTAGE OF STUDIES FOCUSES ON SAMPLES OF YOUNG CHILDREN?

Table 1 presents a summary of the 10 most prevalent journals that were retrieved in this review, along with the single publication that had the most citations in this sample, and a summary of their variable types, and populations of interests. This data shows a relatively even spread in terms of populations of interests, with a more frequent focus on population of older children. For the first 3 journals, for instance, the percentage of studies focusing on population of older children is about 70.8% for *Thinking Skills and Creativity*, about 90.4% for the *Creativity Research Journal*, and about 75% for the *Journal of Creative Behavior*. Table 2 shows 68 of the identified studies focus on population of young children (i.e., 14.9%), 311 focus on population of older children (i.e., 68.5%), 29 focus on populations that mix both age range (i.e., 6.4%). The rest of the identified studies focuses on themes around education and early childhood, albeit focusing with populations of adults (i.e., 3.30%), or as reviews on this topic (i.e., 6.60%). These results support the finding that fewer studies address creativity and creative activities as predictors than as predicted variables, and fewer focus on populations of young children than populations of school age children.

#### WHAT PERCENTAGE OF STUDIES ADDRESS CREATIVITY/CREATIVE ACTIVITIES AS AN INDEPENDENT VARIABLE AMONG YOUNG CHILDREN?

Table 1 further the extent to which some outlets included articles focusing on creative activities and/or creativity as a predictor or a predicted variable. As shown in Figure 2, from 1950 to 2022, the studies included in this review mostly addressed creativity as an outcome. Figure 3 shows that the included studies leaned towards the study of creative activities and creativity as dependent variables, ranging across three ranges of populations of interest (young children, older children, and adults) for about 78.6% of the total of included studies.

TABLE 1. Overview of the characteristics of the most occurred journals in this review

Rank	Journal Occurrences	Most cited publication <sup>a</sup> Publication	Citations count	Total variable		Population of interest <sup>b</sup>	
				Dependent	Independent	Young children	School
1	Thinking Skills and Creativity	Cremin, T., Burnard, P., & Craft, A. (2006). Pedagogy and possibility thinking in the early years	424	33	3	7	24
2	Creativity Research Journal	Kim, K. H. (2006) Can We Trust Creativity Tests? A Review of the Torrance Tests	1202	26	5	2	21
3	Journal of Creative Behavior	Torrance, E. P. (1972) Can We Teach Children To Think Creatively?	864	17	1	3	12
4	Gifted Child Quarterly	Cramond, B; Matthews-Morgan, J; Bandalos, D; Zuo, L (2005) A Report on the 40-Year Follow-Up of the Torrance Tests of Creative Thinking: Alive and Well in the New Millennium	464	8	2	3	12
5	Early Child Development and Care	Holmes, RM; Romeo, L; Ciraola, S; Grushko, M (2015) The relationship between creativity, social play, and children's language abilities	70	8	1	3	12
6	Psychology of Aesthetics Creativity and the Arts	Beghetto, R. A., & Kaufman, J. C. (2007) Towards a broader conception of creativity: A case for "mini- c" creativity	1093	7	1	4	4
7	Croatian Journal of Education	Dragovic, S; Balic, D (2013) Drama Pedagogy – a Way of Learning through Experience and by Doing An Example of Good Practice: Youth Theater Studio of the Croatian National Theater in Varazdin	11	4	3	6	1

TABLE 1. (Continued)

Rank	Journal Occurrences	Most cited publication <sup>a</sup>	Citations count	Total variable		Population of interest <sup>b</sup>	
				Dependent	Independent	Young children	School
8	International Journal of Art & Design Education Studies	Lindstrom, L (2006) Creativity: What is it? Can you assess it? Can it be taught?	237	6	0	2	3
9	High Ability Studies	Feldhusen, JF (2010) Creativity: the knowledge base and children	110	4	1	5	0
10	Perceptual and Motor Skills	Boswell, B (1993) Effects of movement sequences and creative dance on balance of children with mental retardation	57	4	1	4	0

<sup>a</sup>As for 22 October 2022, on Google Scholar. <sup>b</sup>Include only studies that conducted their research on unique population. Studies on mixed sample were excluded.

TABLE 2. Proportions of populations of interest in the included studies

Young children		Older children		Young/Older children		Adults		N/A		Total	
DV	51	DV	242	DV	18	DV	14	DV	29	DV	354
IV	17	IV	68	IV	11	IV	1	IV	0	IV	97
N/A	1	N/A	1	N/A	0	N/A	0	N/A	1	N/A	3
Total	69	Total	311	Total	29	Total	15	Total	30	Total	454

Note. "Young children" refers to populations of children aged between 3 and 6 years. "Older children" refers to populations of children aged above 6 and below 12 years old. "Adults" refers to populations above 18 years old.

Figure 3 presents a closer examination of the repartition of the populations of interest which the included studies focused on. As a general trend, and across populations of young children, older children and above, creativity was addressed as a dependent variable rather than as an independent variable. Among young children (15.19% of the total included studies,  $n = 69$ ), creativity was addressed as an outcome in 73.93% of studies in this population against 24.62% which did not. Among populations of older children, which represented about 68.5% of the total included studies ( $N = 311$ ), the percentage was only about 4 points higher, with 77.8% of the total included sample against 21.86%. In summary, few studies addressed creativity and creative activities as predictors (20.49%), a few focused their populations on young children overall (15.19%), and only a handful addressed creative activities as predictors in populations of young children (3.78% of the total sample).

#### CHARACTERISTICS OF STUDIES THAT ADDRESS CREATIVE ACTIVITIES AS PREDICTORS AMONG YOUNG CHILDREN

Table S1 (see Supplementary materials) presents a summary of all 94 studies that were identified as having addressed creative activities as an independent variable, among young children. Because this review aimed more specifically at answering the question of whether creative activities can contribute to young children's resilience, this section focuses on studies that have addressed creative activities as IV, and which were conducted among populations of young children. For the same reason, this paper does not report any summary of the 311 studies that have addressed creativity as a dependent variable. Tables S2 and S3 (see Supplementary materials) present the characteristics of the 21 studies that have explored the effects of creative

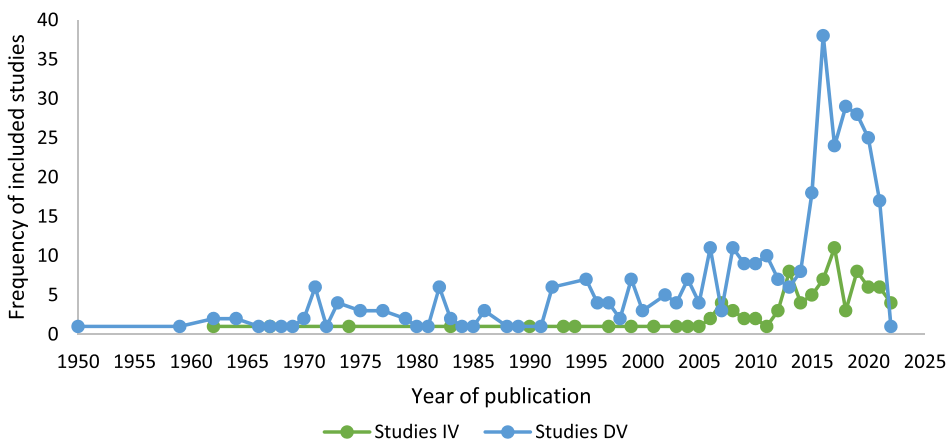


FIGURE 2. Publication trends on creative activities as a predictor or a predicted variable.

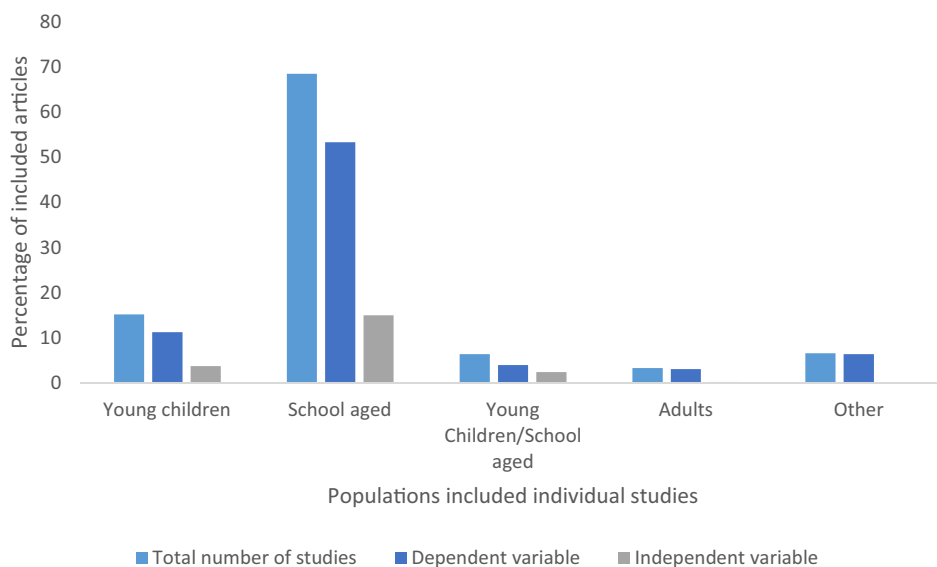


FIGURE 3. Percentage of included studies as a function of whether they addressed creative activities as predictor or predicted variables, and as a function of populations of interest. *Note.* Other includes review articles and book chapters.

activities; their domains; outcomes; evidence of effects; and whether the considered outcomes related to resilience or not. Table S4 (see Supplementary materials) presents a summary of the domains of creative activities found in the included studies.

As presented in Table S4 (see Supplementary materials), in total, 13 creative domains were represented in the studies that addressed creativity as IV: pretend play, drama, music, drawing, painting, modeling/construction, mathematics, clay, photography, cooking, creative puppetry, and story creation/storytelling. In addition, three studies addressed the outcome of divergent thinking. The three most represented domains were art-based: drawing (47.7%), dance (38.1%), and music (33.3%). Most of the studies addressed multiple domains in the same design. Thus, the cumulative percentage of these three domains exceeds 100%. As is further shown in Table S3 (see Supplementary materials), these studies addressed 13 different outcomes, the most frequent of which were interpersonal skills such as empathy (33.3%), sense of mastery/self-efficacy (23.8%), externalizing symptoms (19%), and emotion regulation/coping (19%).

## DISCUSSION

The first objective of this bibliometric review was to document the proportion of the prior research that addressed the outcomes of creative activities on resilience-related factors. The goal was to build an understanding of how much effort researchers exploring creativity have devoted to the study of the creative activities-resilience link, and whether creative activities could contribute to young children's resilience ability.

The first research question addressed whether creative activities contribute to young children's resilience. As this review found, only 20 of these 454 studies addressed the implications of creative activities on resilience-related factors among young children, which accounts for about 4.6% of the total dataset. It is therefore difficult to assert that creativity research to date has devoted much effort to the study of the benefits of creative activities on young children's resilience. On the contrary, a small proportion of the field of study has explored the factors that could contribute to young children's resilience.

A potential reason for the lack of research into the effects of creative behavior is that researchers often assume that creativity is intrinsically beneficial (Forgeard & Kaufman, 2016). It is only recently that creativity researchers have begun to question this view, recognizing that creativity is only beneficial to the extent that its consequences (and the intention behind the creative act) are beneficial rather than harmful, in the long term rather than the short term (Kaufman & Glăveanu, 2023). Just as Guilford (1950) launched creativity research with the axiological aim of promoting economic growth, current directions in creativity research start to advocate axiological frameworks for studying the nuances and consequences of creative behavior (Glăveanu et al., 2020; Kaufman & Glăveanu, 2023). Researchers may therefore have lacked a research agenda or watermark to encourage them to focus on studying the effects of creative behavior on outcomes such as resilience. One may expect that a future review would reveal a new and growing trend in the number of pieces of research that focus on the positive/negative outcomes of creative behavior.

The narrative synthesis of this bibliometric review suggests, indeed some evidence favoring the idea that creative activities could promote factors associated with resilience. In fact, most of the retrieved studies targeted variables that are either promotive factors in resilience (Hoffmann & Russ, 2012; Thayer & Bloomfield, 2021; Yates & Marcelo, 2014) or which tend to reduce outcomes associated with lack of resilience, such as internalizing/externalizing symptoms (Chi et al., 2016; Korošec & Zorec, 2020). While more studies are needed, evidence suggests that creative activities may contribute to resilience among young children. This further supports previous claims in the creativity and resilience research (Verger et al., 2021; Verger et al., 2023).

The second research question in this review addressed the percentage of studies that have conducted research in the field of creativity with samples of young children. This review shows that creativity research tends mostly to study older children rather than children aged between three and six. More specifically, samples of older children were 4.5 times more represented than samples of younger children. One of the main goals of research into the development of creativity is to identify early manifestations of later creative achievements (Barbot, Lubart & Besançon, 2016). Divergent thinking, for instance, seems to appear and increase from age three (Bijvoet-van den Berg & Hoicka, 2014; Torrance, 1968). Research documents, for instance, that 1 year olds' divergent thinking abilities correlate positively with their parents' (Hoicka et al., 2016). Measurement tools, like the Epoch (Lubart, Zenasni & Barbot, 2013), are available to measure early childhood creative potential. Likewise, research addresses how mothers' attitudes at home encourage creative behavior in young children (Karwowski et al., 2021). Creativity researchers therefore recognize the value of conducting research among young children.

Hence, this under-representation could be explained by the methodological limitations that researchers may face, which are inherent in the difference (and natural developmental trends) in cognitive maturation between younger and older children (Deoni et al., 2016). In research on young children's creativity, it can be difficult to access the child's subjective experience. For example, because of the linguistic limitations of young children, researchers resort to questionnaires completed by parents (Karwowski et al., 2021). Similarly, experimental methods for addressing divergent thinking remain somewhat limited to procedures involving playing with blocks for toddlers (Hoicka et al., 2016), and simplifying instructions and materials for divergent thinking tasks for four- to six-year-olds (Vaisarova & Carlson, 2021). It is therefore possible that research on populations of young children is given less attention than research among older children, because researchers can conduct more complex research and collect richer data with older children. If we add to this the lack of research into the benefits of creativity in general, the proportion of studies looking at the effect of creative behavior within the population of young children becomes, indeed, minimal.

The third research question addressed the percentage of research that has focused on creativity/creative activities as a dependent variable versus an independent variable in young children. This review provides evidence that creativity research has tended to overlook the study of creative activities as a predictor, showing a relatively few of the included studies addressed creativity or creative activities as predictors. From 1950 to 2022, and across all top-tier creativity research journals, researchers address creativity as an outcome—a finding in line with data reported by Forgeard and Kaufman (2016) among populations of adults. The results of the present bibliometric review differ, however, in the percentage of studies identified to have addressed creative activities as predictors among samples of young children. Only less than four percent of the total included studies focus on the population of young children. This review, therefore, indicates two things: first, that creativity and creative activities are seldom addressed as predictors. Second, fewer studies have addressed the outcomes of creative activities among young children.

Since its launch, creativity researchers have mostly been concerned in understanding the factors that can predict greater creativity (Guilford, 1950; Kaufman & Glăveanu, 2019). Research certainly values creativity itself as a research topic, because it is assumed that fostering it can lead to societal progress (Glăveanu, 2023), and economic development (Florida, 2014). Consequently, to effectively promote creativity, one needs, first, to study the factors that contribute to it from the smallest manifestation of creative behavior (Kaufman & Beghetto, 2009) to the most outstanding achievements that drive humanity (Carson, Peterson & Higgins, 2005; Glavenau & Kaufman, 2019). It would not be possible to address the effects of creative behavior without first studying the factors that make up creativity as a construct. This could contribute to explain why research seems to have focused so much on creativity as an outcome.

#### STRENGTHS AND LIMITATIONS

The main strength of this review lies in its methodology, as it aimed to address some of the shortcomings that could be found in research by Beghetto et al. (2001), Forgeard and Kaufman (2016), Long, Plucker, Yu, Ding, and Kaufman (2014), and Nemeth and Goncalo (2005). Hence, contrary to previous work, this review did not select articles from *a priori* defined main creativity outlets. (Although, Forgeard and Kaufman (2016) randomized their selection after the *a priori* definition of outlets, and thus had already limited their selection). Rather, this study randomly selected articles using two different procedures: a bibliometric analysis of the most cited papers, and a randomized procedure to retrieve records. With 454 included studies, the size of the present sample is also greater than in these previous reviews. With these methods, the present study found similar results to those reported by Forgeard and Kaufman (2016) on the total percentage of studies that tended to address creativity as a predictor. This increases confidence that the results of both Forgeard and Kaufman (2016) and the present work are indeed representative of the current state of creativity research. These findings, however, are not limited by the source from which the two reviews extracted their data. Hence, the fact that this review only used *Web of Science* as a unique database would likely not constitute a significant limitation to the findings of the present work.

Still, this work cannot directly answer the question of the extent to which creative activities can contribute to resilience ability among populations of young children. Half of the studies reported here were qualitative, and thus by design did not allow for the generalization of their findings, nor for understanding the effect sizes of the potential effects of creativity/creative activities on resilience ability. Most of the quantitative studies that this review reports have the same pitfall. Indeed, they rarely report statistics that would allow understanding of the extent of the observed effects of creative activities. As such, the present work by itself does not facilitate understanding of *when* creative activities are important and beneficial to resilience among young children (Forgeard & Kaufman, 2016). Hence, creativity research would benefit from a systematic review and meta-analysis which would evaluate all of the available evidence on the effects reported in published studies that addressed creative activities on resilience.

#### CONCLUSIONS

The results of this bibliometric review show, overall, that the prior creative research overlooks the effects of creative activities on an important outcome, resilience, during a very vulnerable and important development period for young children's development, i.e., between the ages of four and six. Only less than 4% of the identify studies focus on creative activities as predictors for the resilience of young children. However, this work shows that creative activities can positively contribute to early childhood resilience.

This review is a first step towards further research into the effects of creative activities on factors important for resilience and optimal functioning in young children (Verger et al., 2021; Verger et al., 2023). Although it was not the aim of this study to compare the results of the young children's population with those of the population of children aged over 6, future reviews are encouraged to compare data from the two populations. This would provide interesting insights<sup>2</sup> and highlight potential differences and similarities in findings, constructs, and methods. Data retrieved from articles focusing on populations of older children, which were not examined in this review, remain in full open access (<https://osf.io/kfwtq/>).

#### DECLARATION OF INTEREST

No known conflicts of interest are associated with this publication.

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## DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available in this osf.io folder: <https://osf.io/kfwttq/>.

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## SUPPORTING INFORMATION

Additional Supporting Information may be found in the online version of this article at the publisher’s web-site:

**Table S1.** A summary of all 94 studies that were identified as having addressed creative activities as an independent variable, among young children.

**Table S2.** A complete list of the included studies and their resilience outcomes.

**Table S3.** The characteristics of the 21 studies that have explored the effects of creative activities; their domains; outcomes; evidence of effects; and whether the considered outcomes related to resilience or not.

**Table S4.** Domains of creativity from the included studies among the population of young children.