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Theoretical Understandings and Empirical Approaches to the Measurement of Children's Early Composing

Margaret Quinn

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_____
Gary E. Bingham, Ph.D.
Committee Chair

_____   _____
Mona Matthews, Ph.D.   Nicole Patton Terry, Ph.D.
Committee Member   Committee Member

_____   _____
Cynthia Puranik, Ph.D.   Chenyi Zhang, Ph.D.
Committee Member   Committee Member

_____
Date

_____
Lynn Hart, Ph.D.
Chairperson, Department of Early Childhood Education

_____
Paul A. Alberto, Ph.D.
Dean
College of Education and
Human Development

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Margaret Ferguson Quinn

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Margaret Ferguson Quinn
Department of Early Childhood and Elementary Education
College of Education and Human Development
Georgia State University

The director of this dissertation is:

Gary Eldon Bingham
Department of Early Childhood and Elementary Education
College of Education and Human Development
Georgia State University
Atlanta, GA 30303

CURRICULUM VITAE

Margaret Ferguson Quinn

ADDRESS: 1014 Edgewood Ave NE, #1
                           Atlanta, GA, 30307

EDUCATION:

Ph.D.	2017	Georgia State University	Early Childhood and Elementary Education
M.S.	2009	University of Ulster	Counseling
B.A.	2006	New York University	Interdisciplinary Studies

PROFESSIONAL EXPERIENCE:

2017-Present	University Supervisor
	ECE 3661 P1 & ECE 4662 Student Teaching Supervision
	Georgia State University
2015-Present	Graduate Research Assistant
	iWRITE-PD/Georgia State University
2014-Present	RCALL Language and Literacy Fellow
	Georgia State University
	University Instructor (ECE 3600 Literacy
2014-Present	Learning in Early Childhood and Elementary Education; EDUC 2300 Introduction to Child Development; BRFV 4490 Science, Technology, and Math Methods for Young Children)
	Georgia State University
2013-2015	Graduate Research Assistant
	Urban Child Study Center/Georgia State University
2011-2013	Toddler and Preschool Teacher
	Inman Park Co-operative Preschool
	Atlanta, Georgia
2009-2011	Preschool and Pre-K Teacher
	Over the Rainbow
	Belfast, Northern Ireland

PRESENTATIONS AND PUBLICATIONS:

Quinn, M. & Bingham, G. (2017 July). Examining children's early composing skills: Conceptual, methodological, and developmental considerations. In Hope Gerde (chair), *Early writing and later writing development: An examination of important contexts across time.* Symposium conducted at the annual conference of the Society for the Scientific Studies of Reading, Halifax, Nova Scotia, Canada.

Quinn, M., Pattermann, P., Bingham, G., & Gerde, H. (2017 April). *Early composing, language, and executive function: Relations across the prekindergarten year.* Poster paper presented at the biennial meeting of the Society for Research in Child Development, Austin, TX.

Gerde, H. McRoy, K., **Quinn, M.,** Zhang, X., & Bingham, G. (2017 April). *The feasibility of online teacher professional development for writing.* Poster paper presented at the biennial meeting of the Society for Research in Child Development, Austin, TX.

Zhang, C., Bingham, G. E., & **Quinn, M**. (2017 April). The associations among preschool children's growth in decoding, self-regulation and invented writing skills. In Haruka Konishi (chair), *Self-regulation in early childhood and relations to emergent academic skills.* Poster symposium conducted at the biennial meeting of the Society for Research in Child Development, Austin, TX.

Quinn, M., Bingham, G. E., & Gerde, H. K. (in preparation). Understanding children's early composing using an item-response theory model.

Bingham, G. E., **Quinn, M**., Zhang, X., McRoy, K., & Gerde, H. K. (in preparation). Write to play, play to learn: Writing and playing in the preschool classroom.

Bingham, G. E., Zhang C., & **Quinn, M**. (revise and resubmit). Examining the relative importance of children's language, literacy, and behavioral regulation to invented spelling. *Reading & Writing.*

Quinn, M. (2016 December). Young children's early writing skills at kindergarten entry. In Hope K. Gerde (chair), *Write Time, Write Place: Implications of the Common Core Writing Standards for Preschool Writing Instruction.* Symposium conducted at the Annual Conference of the Literacy Research Association, Nashville, TN.

Bingham, G. E., **Quinn, M.,** & Gerde, H. K. (2017). Examining early childhood teachers' writing practices: Associations between pedagogical supports and children's writing skills. *Early Childhood Research Quarterly, 39,* 35-46.

Quinn, M., Gerde, H. K., & Bingham, G. E. (2016). Help me where I am: Scaffolding writing in preschool classrooms. *The Reading Teacher, 70*(3), 353-357.

Crisp, T., Knezek, S. M., **Quinn, M**., Bingham, G., Girardeau, K., & Starks, F. (2016). What's on our bookshelves?: The diversity of children's literature in early childhood classroom libraries. *Journal of Children's Literature 42*(2), 29-42.

PROFESSIONAL SOCIETIES AND ORGANIZATIONS:

2016	National Association for the Education of Young Children
2016	Society for Research in Child Development
2013	Literacy Research Association
2013	Society for the Scientific Study of Reading

Theoretical Understandings and Empirical Approaches to the Measurement of Children's
Early Composing

by

MARGARET FERGUSON QUINN

Under the Direction of Gary E. Bingham

ABSTRACT

Whereas interest in young children's writing has increased in recent years, the focus has centered more around transcription skills (i.e., letter formation and spelling) and less upon children's early composing. Of the limited research that does exist on early composing, there is little shared understanding around the conceptualization of the construct or how it should be measured. Research to date has utilized varied and sometimes conflicting scoring and assessment techniques to assess early composing skills in young children. In order to more fully conceptualize this construct, the first study synthesizes extant literature focused upon early writing and composing to understand the nature and measurement of emergent composing. The second study aims to examine composing by exploring 160 prekindergarten children's performance on a testing battery including a number of pre-existing and alternative writing assessments in order to explore the nature, measurement, and variability of early composing skills. In addition, this study will examine language, literacy, and executive function skills as they relate to children's performance on early composition tasks. Partial correlations, controlling for children's age, will be

used to determine the degree of relation among children's composing scores. Partial correlations will also be used to examine the associations of composing scores and children's language, literacy, and cognitive skills. Multiple linear regressions will be utilized to determine the nature and degree of relation among children's language, literacy, and executive function skills and early composing. Research of this nature has implications for a more comprehensive understanding of early composing and will lead to a deeper understanding of how to more effectively measure this construct.

INDEX WORDS: Writing (composition), Emergent literacy, Emergent writing, Preschool, Assessment, Scoring rubrics, Early childhood education, Oral language

THEORETICAL UNDERSTANDINGS AND EMPIRICAL APPROACHES TO THE

MEASUREMENT OF CHILDREN'S EARLY COMPOSING

by

MARGARET FERGUSON QUINN

A Dissertation

Presented in Partial Fulfillment of Requirements for the

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DEDICATION

To the teachers and mentors across the years who taught me to write and always believed.

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ABBRIEVATIONS

CELF-P2	Clinical Evaluation of Language Fundamentals, Preschool-2
EF	Executive Function
HLE	Home Literacy Environment
HTKS	Head, Toes, Knees, Shoulders Assessment
PPVT-4	Peabody Picture Vocabulary Test, 4th Edition
SES	Socioeconomic Status
TEWL	Test of Early Written Language
ToM	Theory of Mind
TOPEL	Test of Preschool Early Literacy
WJ	Woodcock-Johnson
WIAT	Weschler Individual Achievement Test
WM	Working Memory

THE NATURE AND MEASUREMENT OF CHILDREN'S EARLY COMPOSING: A REVIEW OF THE LITERATURE

Writing is an activity that involves creating text that serves as a representation of oral language. Particularly with mature and skilled writers, writing is thought to be a highly cognitive exercise requiring the combination of multiple processes such as planning, translating, and subsequently, reviewing and revising (Hayes & Flower, 1980). Writing is critical – research indicates that it is necessary for academic success (Graham & Perrin, 2007). As such, research interest in writing has intensified in recent years. Studies exploring writing have increased in number, leading to a deeper understanding of writing development, education, and relations to other skills and processes, but further research is still needed to understand writing more comprehensively.

Likewise, the area of early writing, that is, writing that occurs before fluent and skilled writing largely during the preschool years (i.e. ages three to five), is understudied but has seen increased interest of late (for example, Puranik & Lonigan, 2011; Diamond, Gerde, & Powell, 2008; Puranik & Lonigan, 2014). Despite this increased interest, much of the construct of early writing continues to not be fully understood and certain components of it are woefully understudied. Considerable research has focused upon children's ability to write their names (Puranik, Schreiber, Estabrook, & O'Donnell, 2014; Welsch, Sullivan, & Justice, 2003; Bloodgood, 1999), write letters (Drouin & Harmon, 2009; Molfese, et al., 2011; Puranik, Petscher, & Lonigan, 2014), and spell words (Clemens, Oslund, Simmons, & Simmons, 2014; Oullette & Sénéchal, 2008). While these skills are important and shown to be predictive of later outcomes (Diamond & Baroody, 2013; Kim, Al Otaiba, & Wanzek, 2015), they represent a somewhat narrow view of

writing – one which only involves using letter forms, spelling words, and understanding concepts of writing – to the exclusion of attempting to understand the variability in children's early composing skills, that is, children's ability to ideate and generate text, going beyond just writing their names, letters, or simple, discrete words. Without determining the nature of early composing and conceptualizing the most efficient ways to measure it, research cannot investigate the predictive importance of this early skill and further, understandings of early writing may be incomplete.

The reasons early composing is often ignored are likely twofold – first, it is difficult to measure and second, the tasks used to measure composing can be too advanced for children depending upon their current writing developmental level (Puranik & Lonigan, 2011). For example, children who are still emerging in their writing ability (i.e. developing the understanding that writing can convey meaning) may not be able to write in an open-ended writing task. This leads many researchers to believe that it is simply not an outcome that can be developmentally appropriately measured outside of investigating children's transcription skills (i.e. handwriting and spelling) in a composing task context (Puranik & Lonigan, 2014), however research indicates that with more structured and less open-ended tasks, variability in composing ability persists (Gerde & Bingham, 2013; Puranik & Lonigan, 2011). Further confounding this issue is the fact that early composing is not fully understood and the literature base does not appear to have a shared understanding or unified definition of what it is, what component skills it involves, or what its importance is in the overall picture of a child's development. Thus, the purpose of this manuscript is to systematically review relevant literature from the last 30 years, in order to interpret and consider the prevailing understandings of the nature and measurement of early composing.

Conceptual Framework & Guiding Questions

Before fully examining the relevant literature in an attempt to begin to unpack the construct of early composing, it is important to first understand a critical conceptual framework that supports this endeavor. Emergent literacy processes, which begin at birth, undergird inquiries into children's early writing and composing. Emergent literacy research, often defined to include writing as well as reading, demonstrates that early reading and writing abilities and behaviors appear to be bidirectional in relation, and the two are likely developing and crystallizing at the same time (Pinto, Bigozzi, Gamannossi, & Vezzani, 2012; Puranik & Lonigan, 2012; Teale & Sulzby, 1986). Although reading and writing are interrelated, it is worth noting that much of the conceptual and empirical literature focused upon emergent literacy centers on component skills and behaviors related specifically to prereading (e.g., Lonigan, Burgess, & Anthony, 2000; Whitehurst & Lonigan, 1998).

Emergent literacy, as a term, first appeared in the doctoral dissertation of famed literacy researcher Marie Clay (1966; cited in Teale, 1987). Emergent literacy is loosely defined as early childhood skills and behaviors that precede fluent and automatic reading (Teale & Sulzby, 1986). More specifically, Paris (2005) posits that literacy is comprised of two distinct but related sets of skills that are developing simultaneously but in different ways – constrained and unconstrained skills. Constrained skills are constrained developmentally, conceptually, or by measurement. These skills are largely code-based in nature and, while demonstrating variability when in stages of partial mastery, eventually reach a ceiling threshold. They are generally acquired in a short period of time. Skills such as alphabet knowledge, phonemic awareness, and ability to read high

frequency words are tightly constrained. With these skills, variability is only perceived and pertinent during the acquisition phase; preceding and subsequent time periods show little variability. While these skills are necessary towards learning to read, they are insufficient in describing the entire process. Unconstrained skills are critical to reading ability. They develop over the lifespan, are difficult to quantify, and are not simply mastered or measured as constrained skills are. Reading fluency and phonological awareness are less constrained and vocabulary knowledge is fully unconstrained (Paris, 2005).

The work of Paris (2005) and others provide similar constructions of literacy as a mostly internal process of coordinating and mastering particular cognitive component skills (for example, Scarborough, 2001; Whitehurst & Lonigan, 1998). Other important theoretical constructions present emergent literacy as a sociocultural phenomenon, impacted by a child's environment, context, and formed through interaction (Gee, 2015; Heath, 1983). The preceding conceptual frameworks defining emergent literacy are critical in providing the theoretical undergirding to support this review. While theorists and researchers have provided a variety of diverse interpretations of emergent literacy, as an understudied and underrepresented aspect of this complex construct, there is even less shared understanding around early writing. Further, as early writing has often been too narrowly defined (Horn, 2005), composing is often an ignored focus in early instruction (Bingham, Quinn, & Gerde, 2017). The adoption of the Common Core State Standards (National Governors Association Center for Best Practices, 2010) has added increased demands on children's composing as early as kindergarten. Despite this, composing is an understudied component of emergent literacy, thus, further investigation into its nature and development is necessary. While a relative paucity of research has explored it in young children, even less is known about its growth over time or its relation to other skills such as language, literacy,

executive function, and other writing skills. The purpose of this manuscript is to thoroughly explore and explain the current, relevant research delving into children's composing. This review will seek to answer questions such as –

1. What is the nature of early composing?

2. Theoretically, what component skills contribute to or constrain early composing? How mught these constraints matter to children's early composing?

3. What are the current measurement techniques for understanding early composing? How do these constructions of composing relate to one another and what are the theoretical bases for these understandings? Do they effectively capture children's early composing attempts?

Method

For the purpose of this review of the literature, three educational databases were searched for relevant literature (PsycINFO, Academic Search Complete, and ERIC). A variety of terms were used for searches as, to date, the field lacks shared terminology (early composing, early writing, text generation). Further, as this review was concerned with measurement and contributing factors as well as the nature of composing, searches included more terms that may allow for research to emerge that may not have otherwise. In addition, asterisks were used around the root word "child" in order to include all grammatical forms, including childhood and children (e.g., early childhood, preschool children). Thus, the following searches were conducted in the three databases:

- Early writing AND Child* (PsycINFO, 86 results; Academic Search Complete, 64 results; ERIC, 91 results; Total, 241 results).

- Emergent writing AND Child* (PsycINFO, 67 results; Academic Search Complete, 43 results; ERIC, 81 results; Total, 191 results).

- Composing AND Writing AND Child* (PsycINFO, 130 results; Academic Search Complete, 296 results; ERIC, 260 results; Total, 686 results).

- Text generation AND Child* (PsycINFO, 22 results; Academic Search Complete, 12 results; ERIC, 10 results; Total, 44 results).

- Early AND Written language AND Child* (PsycINFO, 364 results; Academic Search Complete, 122 results; ERIC, 428 results; Total, 914 results).

- Early writing AND Assessment AND Child* (PsycINFO, 17 results; Academic Search Complete, 6 results; ERIC, 29 results; Total, 52 results).

In total, these search terms yielded the return of 2,127 results. Many of the results were duplicated across searches and databases, leaving 1,597 unique results. Among the returned results, 53 were immediately excluded as they were written in languages other than English with no available translations (for example, Fayol & Miret, 2005). Additionally, 384 results were excluded as they were unpublished dissertation studies, unpublished conference presentations, book reviews, textbooks, or profiles of children's book authors or other figures. As the focus of this review is producing a better understanding of early and emergent composing, results published prior to the publication of Teale and Sulzby's (1986) landmark text, *Emergent Literacy: Writing and Reading*, which represents the formal introduction of the term into the literature (Whitehurst & Lonigan, 1998), were excluded to allow for a more focused examination of recent literature. A further 145 results were deleted that were published prior to 1986. In sum, 1015 results passed the initial inclusion criteria. Subsequently, these results were examined further to determine whether they met the following content-related criteria –

- Age: Articles and other results that focused, either in the context of an empirical study or in terms of theoretical considerations, on children between the ages of 2-7. Primarily, articles were included which featured toddlers, preschoolers, children in pre-K, kindergarteners, and first graders, however, studies emerging from outside the U.S. were included and may use different age classifications.

- Context: Research conducted in or theoretically concerning childcare centers, pre- and elementary schools, homes or lab settings were included.

- Content: Research or theoretical writing should focus or at least mention writing, written language, or composing (as opposed to containing just reading-related or oral language skills)

Subsequently, 208 were excluded due to the age of participants or focal subjects. A further 312 results were about topics other than writing including musical composing, teacher development, history, and linguistics. Among those excluded due to distance from the topic of writing, a great deal related to topics close to writing, e.g. reading skills, such as phonological awareness, phonemic awareness, and letter knowledge, and language, such as vocabulary, sign language, and aphasia, with no explicit mention, measurement, or elaboration on writing processes or writing products. The remaining 495 results were then read more closely to determine whether they met the following inclusion criteria. In order to be considered for inclusion for this review, articles and other results were read closely and assessed as to whether they met one or more of the final inclusion criteria corresponding with the guiding questions.

- Article or result includes a working or operational definition of early, beginning, or emergent composing;

- Article or result empirically or theoretically presents information regarding contributing or constraining factors that might impact composing concurrently or longitudinally;

- Article or result defines or sets forth a method of measuring or assessing early, emergent, or beginning composing.

Of the remaining 495 articles, 227 articles met one or more of the inclusion criteria. In total, 172 articles specifically provide operational definitions of composing; 93 results provide assessment or measurement information; 98 results directly address constraining or contributing factors to children's composing, with 27 articles meeting all three areas of criteria. Information regarding all the included and excluded articles is contained in Table 1.

Table 1. Composing Research Review Exclusion and Inclusion Criteria

Search	PsychINFO	Ac.Searc Complete	ERIC
Search 1 Early writing and child*	86	64	91
Search 2 Emergent writing and child*	67	43	81
Search 3: Composing and writing and child*	130	296	260
Search 4: Text generation and child*	22	12	10
Search 5: Early and written lan-guage and child*	364	122	428
Search 6: Early writing and as-sessment and child*	17	6	29
Total	2127 (1597 unique results)		

Exclusion	Excluded	Percentage of total
Language	53	3.12%
Format	384	24.05%
Year of publication	145	9.08%
Age of focal subjects	208	13.02%
Content focus	312	19.54%

Inclusion (495 results; 227 included)	Number included
Definition of composing	172
Measurement of composing	93
Factors contributing to composing	98

After determining whether articles addressed the needs for inclusion, they were thoroughly read and annotated within each relevant criteria in order to move towards constructing cohesive and comprehensive findings from the review. Within each criteria, themes or focal points emerged and results were categorized according to these themes. For example, when addressing the first

criteria (i.e., the nature of early composing), initial notes were recorded regarding the operational definitions. Further exploration of search results led to more extensive, broader, and salient categories (e.g., cognitive vs. sociocultural vs. mixed understandings; composing as a product, process, or purpose). When addressing the contributing skills and factors, articles and other search results were annotated and categorized based upon the factors and skills that were deemed significant contributors within the research (e.g., language, reading, cognition, sociocultural factors, etc.). Lastly, search results including some form of measurement were coded and categorized based on their measurement in terms of style (standardized vs. non-standardized), task (e.g., narrative, contextual, procedural, etc.), and coding/scoring. Results within each category were further analyzed in order to draw conclusions in regards to content of the current literature base.

Results

Conceptual Definitions of Early Composing

The 172 articles providing operational definitions of early composing varied considerably and provided many divergent, diverse understandings of the construct. While writing conventions, such as handwriting and spelling, are more tangible and fairly easy to define, assess, and promote instructionally, composing is often difficult in these same regards (Meier, 2011). Several articles provided simple understandings of composing. Composing can be defined as an expression of knowledge (Stevenson & Just, 2012), the act of forming or producing written language (Krause, 2015), an expression of ideas (Daiute & Morse, 1994; Strickland & Morrow, 1989), or commonly, the act of making meaning (Cusumano, 2008; Mackenzie, 2011; Snow, Eslami, & Park, 2015). Generally, the differences in operational definitions stemmed from a difference in theoretical approach, with many researchers approaching composing from a more Piagetian perspective, understanding composing as an internal, mostly cognitive, and complex set of

skills that develop in a stage-like progression towards conventionality. Constructions of this nature did not deny the existence of external factors, but they were not emphasized. On the contrary, there is an abundance of literature that approached composing from a more Vygotskian perspective in which composing is defined as occurring as a result of socio-cultural, environmental, and contextual influences, occurring naturally. In an attempt to synthesize the available conceptual definitions, three general categories of particular themes that emerged throughout the literature were established. These include (1) theoretical foundations, (2) perceptions of developmental progressions, (3) the nature of composing as processes, products, or serving diverse purposes. The findings within each category will now be examined, with respect to elucidating prevailing conceptual definitions of early or emergent composing available in the present and relevant literature.

Theoretical foundations. Composing is often defined as a particular component of a larger conceptualization of writing. Famously, in their landmark work, Hayes and Flower (1980; cited in Berninger, 2008 and others) defined writing among mature and skilled writers as a collection of cognitive processes such as planning, translating, and revising. In this understanding of writing, transcription-based processes related to writing, for example, handwriting and spelling, have become automatized to the point that they are no longer a cognitive burden while the individual engages in the writing process.

Building on the work of Hayes and Flower (1980), but providing an understanding of writing that could be more widely applied beyond just skilled adult writers, Juel, Griffith, & Gough (1986) presented the "simple" view of writing and Berninger and colleagues followed with the "not-so-simple" (Berninger & Amtmann, 2003; Berninger & Winn, 2006) view of writing. Both of these theoretical constructions provide an understanding of writing for younger,

beginning writers, albeit not emergent or early writers, which is an important distinction. In these two frameworks, writing was described as being comprised of various skills, including ideation (Juel, et al., 1986) or text generation (Berninger & Amtmann, 2003; Berninger & Winn, 2006), akin to composing. In the simple view, writing was comprised of merely spelling and ideation. The not-so-simple view depicted a more complex definition of composing, in which, composing is a result of other, lower-level and internal processes, e.g., handwriting or keyboarding, spelling, working memory, and executive function (Berninger, et al., 1997). In the work of Juel and Berninger and their colleagues, composing is generally defined as writing as a means of idea expression (e.g., Berninger & Chanquoy, 1997). These definitions of writing, including Hayes & Flower's (1980) model, and the "simple" and "not-so-simple" models (or understandings that are similar) are prevalent throughout the research examined for the purpose of this review (for example, Aram & Besser-Biron, 2016; Clendon & Erikson, 2008; Coker, 2006; Costa, et al., 2012; Graham & Harris, 2003; Puranik & AlOtaiba, 2012; Staples & Edmister, 2012; Yates, Berninger, & Abbott, 1995).

In addition to the work that defined and conceptualized composing within a larger framework of writing among skilled writers, other researchers have sought to better understand the development of composing and writing more generally prior to the onset of conventional writing. Similar to preceding models, Kaderavek, Cabell, and Justice (2009) described writing as being comprised of children's composing, the ability to generate text for writing, as well as spelling and handwriting. Importantly, Puranik and Lonigan (2014), in an attempt to understand children's early writing development, defined composing as a child's ability to write above the word level. In this case, generative knowledge, synonymous with composing, was a component skill contributing to an overall theoretical framework describing early writing. These early writ-

ing frameworks, and those previously examined intended for older writers, seemed to view composing as a largely internal process supported by, or developing in tandem with, cognitive component skills. However, despite the inclusion of composing in understandings of early writing, several of the articles reviewed indicated that composing was not important to consider prior to the development of conventional writing. Berninger and Chanquoy (2012) note that cognitive writing, that is, writing to express ideas, does not emerge until kindergarten or later. Further, Puranik and colleagues (2016) noted that true composing can only take place once children have acquired conventional transcription skills. Cognitive, more Piagetian-influenced constructions of early writing view composing as an outcome "reflecting the overall sophistication" of children's written products (Rowe & Wilson, 2015, p. 248). While component skill models have dominated much of the empirical research in early writing, a preponderance of researchers and theorists took a different approach and theoretical stance among the work reviewed for this inquiry.

Much of the research sought to define composing from an entirely different perspective: seemingly or explicitly inspired by a more Vygotskian, sociocultural approach. The seminal work of Dyson (for example, 2010a; 2010b) presented writing as a sociocultural phenomenon, rather than a largely internal process or set of processes. To this end, composing was depicted as a more fluid, flexible process, impacted by external, contextual, and environmental factors, such as classroom environments, social interactions, and home literacy environments. Research and theory of this nature, as opposed to understanding writing generally as comprised of multiple component skills, depicts writing more holistically. Writing is comprised not of component skills but rather, complex cultural macro- and microsystems.

Quite simply, from this Vygotskian standpoint, the emphasis in defining composing was placed more upon the methods children used to construct meaning (Bloch 1997; 1999) than the

actual meaning they constructed. Thus, the processes children engage in writing define the construct of composing, as opposed to the actual writing products they have generated. Obviously, there was much less focus upon skill-level and demonstrated abilities related to writing and an increased interest in the interactions and conversations – with teachers, parents, peers, and self – that took place during the composing process (for example, Daiute & Dalton, 1993; Dyson, 1992). Composing, in research of this ilk, took a more open-ended and inclusive form – it was not simply translating ideas into conventional written text but also the "social context" in which writing took place (Dennis & Votteler, 2013, p. 441). Much of this social context was depicted as authentic conversations (Jones, 2015; Kelly, Klein, & Pinnell, 1996; Lomangino, Nicholson, & Sulzby, 1999) in the classroom or the home or even as play (Dyson, 1991). Dahl and Freppon (1994) contended that children, through transactive and interactive processes with their teachers, began to understand and establish roles necessary for composing. Daiute (2002) called for a social-relational construction of composing and placed emphasis on peer interaction and the co-construction of knowledge and meaning.

Further, the act of composing was often viewed in these research contexts as oral language – either through the externalizing of a child's metacognition, self-talk, or even dictation (Myhill & Jones, 2009; Pontecorvo & Zucchermaglio, 1989). Writing was understood as a linguistic process and a linguistic form (Schrader, 1989). Likewise, Hoffman and Roser (2002) noted that as oral language, reading, and writing are mutually supportive constructs; when children used oral language as a form of composing (i.e. dictation), they were bridging the gap between these three constructs. Children's oral language, or talk, represented the process of deliberately using language symbols to compose and to move towards conventional literacy acquisition (Tolentino, 2013). Children appeared to use their further developed oral language to partici-

pate in composing (Kissel, 2011) often to engage in invented spelling processes and to orally

elucidate the meaning behind their written products which may not yet be conventionally legible.

However, researchers warned of the differences between oral and written language – primarily in

that writing is decontextualized (Lartz & Mason, 1988) and a much more deliberate and inten-

tional activity than children's use of oral language (Mason & Allen, 1986).

Further research also depicted children's use of unconventional symbol systems, such as

drawing, as composing (Mackenzie & Veresov, 2014; Wu, 2009). Relevant literature offered

conflicting information as to whether drawing and writing are independent and should be consid-

ered as such. Some literature emphasized the divergence between drawing and writing (Akita,

Padakannaya, Prathibha, Panah, & Rao, 2007; Barclay, 1991), often indicating that in order to

develop writing, children must begin to distinguish between drawing and writing (Mayer, 2007;

Zecker, 1996) or that drawing precedes writing developmentally (Christie, 1990; Sulzby, 1980,

cited in Beauchat, Blamey, & Walpole, 2010; Berninger & Chanquoy, 2012). Others viewed

drawing as a form of composing, which children used either on its own or alongside more con-

ventional forms of writing interchangeably (Rowe & Miller, 2016). Many view composing as the

combination of some or all of these preceding systems – social interaction, expressive oral lan-

guage, self-talk, and or dictation, play, and using drawing - cumulatively as a means of commu-

nication (Horn, 2005; Miller, 1998; Neves & Reifel, 2002; Yaden, Rowe, & McGillivray, 2000).

Considerable research further tapped into an even broader still theoretical foundation ac-

counting for both the Vygotskian, sociocultural view of writing, as well as the more Piagetian

and cognitive view of writing. Work of this nature defined composing while emphasizing both

internal and external processes. For example, Brown and Briggs (1991) emphasized the social

nature of writing while maintaining that the oral language children may use while engaged in the

writing process was an externalization of inner thoughts used to develop writing skills while still being an individualized process in which some components occur internally. Rowe and Wilson (2015) understood composing not from a component skills approach, wherein composing would only be recognized by how conventional it is, or from an emergent literacy perspective, wherein composing is representative of children's thinking around and understanding of literacy, print, and writing; instead, the researchers attempted to define composing as both a part-to-whole (component skill) and whole-to-part (emergent literacy) understanding. Jones (2015) explicitly defined composing as being undergirded by both cognitive theory where critical elements include writing processes like planning, translating, and reviewing along with long term memory, which supported the writer's response to the particular task or writing context, as well as sociocultural theory, where the produced text had been socially mediated. Likewise, Wollman-Bonilla (2015), stated that composing occurs based upon the complex and dynamic integration of literacy-based skills and sociocultural factors. Clearly, among the relevant literature, there was a prevailing understanding that composing, and writing more generally, represented a sociopsycholinguistic process – emphasizing the importance of understanding cognitive, linguistic, situational, cultural, and social factors in order to fully encapsulate it (Harste, Burke, & Woodward, 1994). In sum, composing was defined as a process impacted by external and environmental factors as well as internal and cognitive factors. These factors continually interact at all points in children's development of composing (Morgané e Silva, 1988).

Developmental progressions of early composing. Operational definitions of composing described in the research evaluated for this review differed in terms of their view of the nature of the development of early composing. Considerable literature veered towards a more Pia-

getian construction of development depicting a stage-like progression that transpires predictably, while other research offered alternatively a more fluid Vygotskian construction in which composing developed continuously and flexibly. These disparate understandings of the nature of the ways composing develops are essential to encapsulating a comprehensive, operational definition of the construct of early composing.

A proliferation of research investigating early writing used phases, stages, or developmental levels in order to explain the ways in which written language is operated and acquired by young children. Many of these constructions of writing development stages relied heavily upon children's successful use of well-formed letters, conventional spelling, and an understanding of the ways in which writing functions. For example, foundationally, Sulzby (1980) provided a seven-stage progression wherein children move from drawing as writing, scribble writing, letter-like shapes, nonphonetic letter strings, copying print from the environment, invented spelling, and conventional spelling (cited in Beauchat, et al., 2010). Other researchers have employed similar developmental progressions, largely focusing upon children's transcription skills, e.g. handwriting and spelling, and conceptual knowledge of writing (Barclay, 1991; Both-de Vries & Bus, 2008; Dennis & Votteler, 2013; Puranik & Lonigan, 2011). Other progressions of development included elements of composing beyond demonstrated conventionality. Bakst and Essa (1990) indicated that writing progressed through handwriting and spelling acquisition stages and eventually incorporated composing-related facets such as revision and a sense of audience. Other progressions included handwriting and spelling to various degrees of conventionality as before, but in addition, included phases or stages that accounted for the ability to produce writing that is representative of the intended message (Cabell, Tortorelli, & Gerde, 2013; Levin, Both-de Vries, Aram, & Bus, 2005). More comprehensively, Bialystok (1992) offered a progression of the de-

velopment of indirect representation, or the ability to use writing symbolically to represent ideas, beginning with children's understanding that numbers and letters come in a sequence, such as the alphabet or in counting (conceptual representation), then with the writing of individual units and the understanding that those units can carry meaning even if the child has not quite grasped the symbolic properties (formal representation), and eventually ends at writing conventionally (symbolic representation). Other developmental progressions accounted for the acquisition of the understanding that writing needs to be altered in order to suit the circumstance or context, i.e. genre (Berninger, et al., 2006).

Another body of work considered development to be more continuous, flexible, and dynamic. Substantial research pointed to the notion that children moved fluidly between methods, modes, and means of composing or conveying composition as opposed to occupying a particular phase or developmental stage (Edminster, Staples, Huber, & Garrett, 2013). Further, Dyson (1992) criticized the use of narrow understandings of writing development, which explained writing by investigating the way various skills and understandings (e.g. composing processes, genre knowledge) changed over time. Instead, Dyson explored not children's improvements toward conventionality as time and development progressed, but how children used and manipulated writing and the ways in which writing required them to inhabit different roles (Dyson, 1988). The parallel nature and recursive relationships between writing and oral language, reading, drawing, play or interaction, means that children are shifting constantly in between various modes of communication, meaning making, and composing (Clem, 1990; Dyson & Genishi, 1991; Guo & Mackenzie, 2015; Mackenzie, 2011). Of critical importance to this overall construction of the development of writing as continuous and tenuous: marks and scribbles appeared meaningless to adult eyes apart from a step in a developmental progression, however children

felt that each scribble has its own meaning and represented something significant (Coates, 2002). In order to understand composing development, and composing itself, researchers suggested that it was important to consider the ways in which children took up writing, what they wrote, and why they wrote it in order to understand it, rather than simply prescribing and attempting to fit it to a set of developmental steps.

Writing as a product, process, and/or purpose. Further research reviewed conceptualized composing and its nature in myriad ways, often either focused on composing products, the process of composing, or the purpose of composing, or a combination therein, to form the functional and operational definition. Of course, the term 'writing,' in and of itself can be used to describe semantically different constructs – writing can be the actual, decontextualized writing artifact, the processes enacted in order to write, and can be defined by its uses (Perez, 2004; Schrader, 1989). It can be a linguistic form or a linguistic function (Scott & Rogers, 1996). The choice of focusing the definition of writing as a product, process, or purpose often determined the unit of study (or the inverse, that the unit of study may have impacted the understanding of the nature of composing) with research exploring (a) decontextualized products children produce, (b) the processes they engage in when writing, and/or (c) the motivations for writing.

In work that emphasized composing products, the focus was upon the writing the child was able to produce. Often, this was the degree to which children could produce legible and conventional writing (for example, Puranik & Lonigan, 2011). In this work, children's writing products in particular task contexts were examined to understand writing development and composing ability along largely predicable lines - products were analyzed according to their degree of sophistication or conventionality, i.e. generative products score high cumulative scores when they display conventionality in terms of print concepts (linearity, horizontality, left-to-right ori-

entation), handwriting (discrete units, well-formed letters), and spelling (invented or convention-al spelling) (e.g., Puranik & Lonigan, 2011). Other extant literature argued the need to under-stand composing products beyond just simply looking at the conventionality of the writing (Aram, Most, & Simon, 2008) and relying not on proper handwriting mechanics or phonological spelling, but rather on iconicity of their writing (Treiman, Kessler, Decker, & Pollo, 2016). By employing this type of definition, the nature of composing becomes more blurred. Among younger and less skilled writers, composing could be more inclusive to products that do not bear as much resemblance to the writing expected of adults or that which can be read by adults. It is critical to conceptualize early and emergent composing with a dimension of iconicity that can extend beyond just conventionally sophisticated writing to understand emergent composing at various ability levels, capturing the wide range of variability that exists in this dynamically de-veloping phenomenon (Rowe & Wilson, 2015). Only considering composing symbolic when it can be read conventionally makes the focus of emergent composing exceedingly narrow and constrained within a certain time and space. Conceptualizations of composing should encompass the stage at which children are beginning to write conventionally and all the writing that occurs before children have acquired more advanced transcription skills.

One article examined for the purpose of this review included "It doesn't have to be like grown-up writing. Just do it your own way," as a prompt for a composing task, for example (Fields & DeGayner, 2000, p. 135). Many researchers included drawing or art (Edminster, Sta-ples, Huber, & Garrett, 2013; Fisher, Albers, & Frederick, 2014; Guo & Mackenzie, 2015; Wu, 2009), unconventional graphemes (Coates, 2002; Neves & Rivel, 2002), and expressive oral lan-guage such as storytelling or orally composing (Skantz-Åberg, Lantz-Andersson, & Pramling, 2014) as a part of composing products. Further research used composing products as a means of

examining children's understanding of literacy (Olofsson, 2008) and their motivations to use writing (Fisher, et al., 2014).

Alternative definitions presented a description of composing that was more focused upon the processes involved. Some researchers asserted that examining writing products led to a less robust encapsulation of the dynamic and complex activity of composing (Dyson, 1991; Fisher, 1994). Often, composing was construed as one or a set of largely internal process(es) (Berninger, et al., 1997; Borzone de Manrique and Signorini, 1998; Bourke, Davies, Sumner, & Greene, 2014). Of course, the seminal construction of writing for adults described composing as several processes occurring sequentially – i.e., planning, translating, and reviewing (Hayes & Flower, 1980, cited in Berninger, 2008; Graham & Harris, 2003). The simple and not-so-simple views described the process of writing as transcription and text generation, activated by working memory, leading to composing. Skandalaris (1998) defined the process of composing as idea generating internally and attempting to find ways and means of translating those generated ideas into text. In this instance, the process of searching for methods to translate relies heavily on transcription skills whereas the internal idea generation represents composing. Puranik and Al Otaiba (2012) asserted that composing required the coordination of multiple skills, such as, transcription, language, and cognition. Similarly, composing has been presented as an act of problem solving (Hooper, 2002), that is, children used what they knew to construct writing (Jacoby, 2005; Kenner & Kress, 2003; Tolentino, 2013). Further research presented composing as the process by which children actively engage in writing and devise ideas for writing (Gerde, Bingham, & Pendergast, 2015) or express ideas or meaning (Daiute & Morse, 1994; Peterson, McIntyre, & Forsyth, 2016; Snow, et al., 2015; Strickland & Morrow, 1989) via different means.

Lastly, researchers have set forth definitions of composing that emphasized the purposes of composing (Al-Maadadi & Ihmeideh, 2015). Researchers provided definitions of writing that focused upon writing serving two main purposes – either authorial purposes or secretarial purposes. Authorial writing is writing that serves as a means of communication, with an audience in mind, whereas secretarial writing is writing that focuses upon surface textual features, relaying information to be remembered (Bromley, 2007; Leyva, Reese, & Wiser, 2012; Mackenzie, Scull, & Bowles, 2015). Further research emerged that attempted to define the purposes of writing or composing even more comprehensively – for example, noting that composing could serve several purposes including labeling, retelling, expressing opinions, making connections to the text (Arujo, 2002) or could be instrumental, regulatory, interactional, personal, heuristic, imaginative, or informative (Schrader, 1989). Conceptualizations that added a focus on writing purposes also sought to include writing or composing motivations as a defining factor (for example, Boyle & Charles, 2010).

Additionally, considerable research combined composing elements of product, process, and purpose in order to define the construct. For example, composing was understood as a dynamic set of processes that vary considerably depending upon the purpose, context for writing, or the intended audience (Pontecorvo & Orsolini, 1996) or that processes and purposes are separate but feed into a singular composing mechanism (Boldt, Gilman, Suyong, Olan, & Olcese, 2011). Read (2007) defined writing as a psychological process of constructing a composition or a physical process of forming letters, but considered the emerging text product resulting from either of these types of processes critical for its definition. Ultimately, research variably presented writing focused upon various forms, functions, and uses of writing to construct their respective defini-

tions of composing. These constructions are critical as they inform current understandings of composing and the possibilities of units of study in research.

Skills, Behaviors, and Factors Contributing or Constraining Early Composing

Of all the articles included for review, 98 articles were returned in the various searches that provided either empirical or theoretical contributions to composing. The majority of this work focused on understanding the relations between writing and other developmental skills, behaviors, and factors that might contribute to or constrain children's composing. Research specifically focused upon early composing and its relationships with other developmental skills or factors is somewhat limited but compelling. Importantly, of the current, relevant work providing evidence for the factors impacting composing, the majority were focused on slightly older children who are more skilled in writing in a variety of different focal areas (e.g., Hooper, et al., 2011; Berninger & Chanquoy, 2012).

Early writing. Early writing skills, such as handwriting, spelling, and conceptual knowledge of writing likely contribute to children's ability to compose. Research indicates that children's ability to generate text is highly constrained by handwriting in the early elementary years (Berninger, et al., 1997; Medwell & Wray, 2014; Puranik & Al Otaiba, 2012). Handwriting, frequently measured by letter fluency or automaticity, was strongly correlated to composition quality (Adams, et al., 2013; Bourke, et al., 2014; Medwell & Wray, 2008; Meier, 2013). Research showed that among young writers, i.e. ages 3-6, handwriting was related to increased levels of sophistication in children's early composition attempts (Chi, 1988; Puranik & Al Otaiba, 2012; Puranik & Lonigan, 2011; 2014). Further suggesting the importance of handwriting to composing, interventions and handwriting-focused instruction were demonstrably effective in increasing children's composing skills (Berninger, 2008; Berninger, et al., 1997). Based

on reviewed literature, whereas handwriting undoubtedly appeared connected to composing, the precise nature of this relationship seemed unclear, and potential mediating factors, such as age, gender, and working memory were suggested, tested, and confirmed (Berninger, et al., 1997; Graham, Berninger, Abbott, Abbott, & Whitaker, 1997; Jensen, 1990; Jones & Christensen, 2012).

Additionally, children's spelling ability, use of invented spelling, and demonstrated phonographic knowledge was related to composing. As with children's handwriting, research suggested moderate to strong correlations (Adams, et al., 2013; Bourke, et al, 2014; Kent, Wanzek, Petscher, Al Otaiba, & Kim, 2013; Puranik & Al Otaiba, 2012). Further, specific spelling interventions and instruction yielded gains in composing (Berninger, 2008; Hoflundsengen, Hagtvet, & Gustafsson, 2016). Ultimately, the connections between transcription skills, such as handwriting and spelling, and composing were dependent upon the ways in which composing was defined. As in many studies focusing upon component skill models (i.e. mostly cognitive models) of composing and writing development, researchers examined composing by considering the sophistication or complexity of the writing output provided (e.g., Adams, et al., 2013; Graham & Harris, 2006; Sulzby, 1989), thus, it was unsurprising that these skills, composing and spelling, were consistently related. Among young children who are just beginning to compose, particularly within a context in which composing can only occur after a transcription threshold has been reached, these component processes of handwriting, spelling, and composing are correlated to one another to varying degrees (Puranik & Lonigan, 2014) and because of the measurement and conceptualizations of composing as reflected by transcription, these components are likely inextricable from one another.

In addition to acquiring handwriting and spelling skills, research reviewed for the purpose of this inquiry further suggested that children's knowledge of writing conventions and understanding of the ways in which writing and text works were important contributors to early composing. Daiute and Morse (1994) suggested that the concepts that children must begin to understand in order to move towards skilled writing included the directionality of print among other elements. More specifically, and more foundational, Dinehart (2015) implored that children must understand the symbolic nature of letters, among other conventions. Further, the work of Puranik and Lonigan (2014) suggests a moderate, positive relation between conceptual knowledge and composing.

Emergent reading. Articles reviewed also pointed to another critical set of skills informing and supporting children's early composition - the specific set of emergent literacy skills related to reading. Reading and writing are included in the larger construction of emergent literacy (Teale & Sulzby, 1986), are interrelated (Strickland & Morrow, 1989), and developing concurrently (Edminster, et al., 2013). Further confounding, there is no completely unified and discrete understanding of the nature of the skills contained within these constructs and how reading and writing might differ, converge, and share skill sets. Research has considered reading and writing holistically. However, additional research has sought to tease apart various smaller important component skills in reading, that predict later performance and converge towards fluent reading, and their relations to composing. These skills include print awareness, letter and letter-sound knowledge, phonological awareness, and the alphabetic principle, and comprehension.

Just as concepts related to writing were related to composing in young children, similar concepts, those focused on print, and conceptual knowledge related to reading correlated to composing (Pinto, et al., 2012). It is the acquisition of reading-specific literacy skills that alters

the ways in which children write and perceive writing. According to extant literature, it appeared that the establishment of links between writing and reading transformed children's view of writing: beginning as a discrete, separate construct that lacks meaning, eventually, leading to the understanding that writing is used as encoded text to convey meaning (Ferriero, 1986). Research suggests, and has focused upon, children's understanding of the uses, conventions, and functions of print as particularly overlapping between emerging reading and writing skills (Justice, Bowles, & Skibbe, 2006; Treiman, Mulqueeny, & Kessler, 2015). In this line of research, the focus primarily was on children's knowledge of conventions and tended to ignore children's knowledge of the functionality of print, including how they use, produce, and interact with text, in other words, compose (Leyva, Reese, & Wiser, 2012). Further, research suggested that print awareness was a precursor to skilled writing (Logue, et al., 2009), while others suggested that children write prior to reading (Fox & Saracho, 1990; Reiben, et al., 2005) and that print awareness, merged with other skills, (e.g., oral language and phonological awareness) amalgamated in children's writing (Wheatley, Gerde, & Cabell, 2016). Regardless of the sequence of acquisition, it is ultimately the convergence of understanding about conventions and functionality of print that may inform children's early composition, however to date, research that accounts for both of these aspects of early composing and reading is limited.

Further research investigated specific relations between composing and code-based reading skills like letter knowledge, letter-sound knowledge, phonological knowledge, and the alphabetic principle. As reading and writing likely develop simultaneously (Barclay, 1991), these code-focused skills are especially important for transcription (Diamond, Gerde, & Powell, 2008). Researchers, throughout the review of the relevant literature, noted that the alphabetic principle (Olofsson, 2008), knowledge of letters (Coker, 2006), letter-sound knowledge (Pinto, et al.,

2012; Wollman-Bonilla, 2001), and phonological awareness (Pinto, et al., 2012; Puranik & Lonigan, 2014; Wheatley, et al., 2016) were related to children's composing. Compellingly, children with code-focused reading deficits, such as dyslexia, often struggled with composition (Butler & Monda-Amaya, 2015; Sumner, Connolly, & Barrett, 2014) further supporting the connections between code skills and composing.

While not necessarily two sides of the same coin, composing and comprehension are linked and dependent upon one another. Composing and comprehension both represent higher-order and cognitively more demanding processes (Berninger & Chanquoy, 2012). Research among first graders found strong connections between composing and comprehension (Berninger, et al., 2006; Berninger & Chanquoy, 2012).

Language. Another important factor that arose in the review of relevant literature was that of language development. As writing demonstrates children's understanding of written language, it is obvious that children's oral language would provide "a rich reservoir" towards composing written text (Myhill & Jones, 2009). Language appeared to be associated to composing in several different ways. First, considerable literature emphasized the relationship between oral language and writing holistically. Further work investigated composing and its concurrent relations with language components, parallel relationships with language uses (e.g., oral narratives and story telling), and children's use of oral language while engaged in writing.

As both oral and written represent two main language domains, they are inextricable in many ways. Oral language serves as a precursor to written composition (Horn, 2005; Pontecorvo & Morani, 1996; Schickedanz & Casbergue, 2009). Though children likely acquire oral language before written language, they must first learn that oral and written language operate in tandem (Roskos, Tabors, & Lenhart, 2009). Research suggested that oral language and writing develop

similarly and are mutually supportive (Martlew, 1988). Research indicated a moderate correlation between children's language skills and their early writing ability (Puranik & Lonigan, 2012) and longitudinal relations between early language and later written composing (Schickedanz & Casbergue, 2009). Several studies reviewed indicated that children who have language or speech impairments struggled with writing concurrently or longitudinally (Hall & Segarra, 2007; Puranik, Al Oitaba, & Ye, 2014; Sices, Taylor, Freebairn, Hansen, & Lewis, 2007), further suggesting the connectedness of oral and written language. To compose, it is necessary to understand that writing is a form of communication and requires translating thought into text, or oral language into written language (Graves, 2003). Subsequently, children must incorporate the rules applied to oral language to written language (Kim, Al Otaiba, Puranik, Folsom, Greulich, & Wagner, 2011).

Research reviewed demonstrated that some of these rules of oral language form, content, and use, i.e. language components, including phonology, the rules that govern individual sounds and the ways sounds are combined; morphology, the rules that govern the structure of words; syntax, the rules that govern the grammatical structure of language; semantics, the driving force of meaning in language; and pragmatics, the ways in which language can be used in a variety of different contexts for different reasons and purposes (Bloom & Lahey, 1978) were likely related to early composing, however research specifically investigating these relations appeared to be somewhat limited. Research indicated that phonology (Hooper, et al., 2011), morphology (Goldblatt & Friedman, 1999) and syntactical knowledge (Daiute & Morse, 1994; Clendon & Erikson, 2008) were associated with composing among slightly older writers. Further research investigated language by measuring children's receptive or expressive vocabulary and mostly found strong associations between children's vocabulary knowledge and their composing among

kindergarten and first graders (Clendon & Erikson, 2008; Kim & Schatschneider, 2017) and among pre-kindergarten-aged children (Bourke & Adams, 2010). However, Puranik and Lonigan (2014) noted no significant relations between children's early generative abilities and definitional vocabulary. Thus, the relations between vocabulary and other components of language and children's early composing is still unclear.

From a wider perspective, research suggested that writing was impacted by language as a result of the uses of language preceding children's attempts to write, such as with narrative construction. Research suggested that oral storytelling preceded composing (Horn, 2005). This is particularly relevant when considering the oral and written registers: several studies investigated children's language use when providing a strictly oral narrative (responding to a prompt such as, "Tell me a story") compared to an orally provided decontextualized narrative designed for writing (i.e., written register; responding to a prompt such as, "That is a good story. Will you tell me again and this time I will write it down") (Purcell-Gates, 1994; Purcell-Gates & Dahl, 1991; Ruan, 2004). In these instances, it is likely that the language children provide, which researchers have applied as a composing proxy, was inherently connected to children's oral language ability while still differing from strictly oral language as a result of its decontextualized nature. Like assessing children's written registers, that is, oral language that is used as a proxy for writing with an audience in mind (Fang & Cox, 1999), further research illustrated the fact that expressions of composing are often accompanied by oral outputs in order to understand children's intentions before their print and spelling are conventional enough to read (Gerde & Bingham, 2013; Leyva, Reese, & Wiser, 2012; Rowe & Wilson, 2015). Not surprisingly, then, oral and written language appeared to be related.

Further research also indicated that children talk about their writing while engaged in the process (Sulzby, 1986). This may be because children of preschool-age use inner speech, theorized by Vygotsky as the dialectic and articulated external speech that appears during a child's early years and is internalized over time (Vygotsky, 1986). Young children, prior to the acquisition of conventional composing, often used dictation or other forms of oral language taken up while engaged in writing, to support their writing products (Neves & Reifel, 2002). Porter (1989) also believed that children used oral language as a means of revision in composing. Further, as language develops in preschool and children's symbolic thinking commences, true idea generation occurs and leads to composing (Zins & Hooper, 2012). Young children who are composing must draw upon cognitive skills and make and translate meaning onto the page, suggesting that many may rely upon externalized inner speech to accomplish writing tasks (Mahn, 2012) and potentially, this would draw upon working memory in addition (Berninger, et al., 2010). Collectively, although research reviewed indicated connections between children's language and early composing development, the nature of that relationship is still not fully understood.

Cognition. Researchers also cited several cognitive factors that impacted children's early composing. As writing is theoretically a very complex skill, it requires the amalgamation of many lower-order processes and higher-order cognition simultaneously (Chung & Patel, 2015; Puranik & Al Otaiba, 2012; Troia & Graham, 2003). Thus, it likely draws heavily on cognition and is likely impacted by cognitive components such as executive function (EF), Theory of Mind (ToM), working memory (WM), metacognition, and general intelligence (IQ).

Throughout the articles reviewed for the purpose of this inquiry, executive function was predominately featured as a contributing or constraining factor. Executive function is a general term reflecting the use and management of cognitive processes (Anderson & Reidy, 2012).

These processes include attentional control or flexibility, inhibitory control, goal setting, informational processing, among others. Importantly, executive function skills include the processes that comprise skilled writing (Hayes & Flower, 1980): planning, translating, reviewing, and revising. Among early elementary students, growth in executive function has been linked to written expression and spelling (Altemeier, Abbott, & Berninger, 2008). Hooper and colleagues (2011) found that along with handwriting fluency and language development, EF contributed significantly to first graders' composing ability. While limited research has specifically explored the contributions of EF to written composition, two studies (Fang & Cox, 1999; Zins & Hooper, 2012) found evidence of an impact of EF on oral composing (i.e., oral decontextualized language/written register).

One specific executive function that reviewed research indicated acted as a contributor to composing was Theory of Mind (ToM), the understanding of others' thoughts and feelings as separate from one's own which develops considerably during the preschool years (Wellman & Liu, 2004). Theoretically, ToM impacts composing as writing requires knowledge of an audience and requires the writer to use decontextualized language to that end (Leyva, Hopson, & Nichols, 2012). According to relevant research, ToM indirectly impacted first grade children's composition ability (Kim & Schatsneider, 2017) while other research found direct impacts of ToM on narrative composing (Schickedanz, 2000) and longitudinal effects of ToM in prekindergarten on later composing in kindergarten and first grade (Peskin, Comay, Chen, & Prusky, 2016).

Another cognitive component that appeared to be exceedingly critical to emergent composing was working memory (WM), that is, short-term memory that is utilized or held for processing (McClelland & Tominey, 2014). Already thought to be important towards the coordinat-

ed use of transcription, other executive functions, and composing among older, more developed writers (Berninger & Amtmann, 2003; Jones & Christensen, 2013), research indicated that working memory was important to young children's early writing (Bigozzi & Vettori, 2016; Flor-Maduel, 2008). Existing research showed that working memory was important for narrative composing among kindergarten-aged children (Bourke, Davies, Sumner, & Green, 2013) and that WM underlies both oral and written language (Bourke & Adams, 2003), as children need working memory to follow and remember directions (Aram, et al., 2013), to be able to plan writing or narratives, coordinate multiple skills, translate ideas into text (McCutchen, 2000), and to remember the distinct relationships between physical written forms and corresponding sounds and letter names (Berninger, 2009). These findings, mostly among older samples of children, indicate the need to consider working memory when conceptualizing early composing and particular impacting factors.

In addition to components of executive function, other factors related to cognition and their relations to composing have been explored in the relevant research, albeit to a more limited extent. Considering metacognition, or the intentional reflection and regulation of one's thinking, Ruan (2004) linked children's metacognitive utterances during a composing task to their composing abilities. Further studies noted moderate correlations between IQ and composing (Goldblatt & Friedman, 1999; Puranik & Al Otaiba, 2012). While research examining these cognitive factors is exceedingly limited, extant literature indicated that as composing is a demanding task, it is impacted by intelligence and cognition more generally, demanding further examination.

Contextual and demographic factors. Research reviewed for this inquiry frequently emphasized the importance of demographic characteristics, such as gender, age and development, and socioeconomic status (SES), and contextual factors, such home literacy environment

and related parent, teacher, peer, and classroom factors, that could additionally have a direct or indirect impact on early composing.

Age and development obviously affected children's ability to compose, as composing requires children to enact a number of skills of varying difficulty; older children tended to outperform their younger counterparts (Jensen, 1990; Puranik & Lonigan, 2011; 2014; Rowe & Wilson, 2015; Purcell-Gates, 1994). Further indicating the importance of these factors, even prenatally, children who were preterm infants performed significantly worse than typical peers in a narrative writing task at age six. Age and development can mediate the degree to which children employ mental effort to various component skills – transcription skills were the most important contributors to composing for younger children as compared to older peers (e.g., Graham, et al., 1997). Given available research it was clear that age acted as a critical factor impacting children's composing, likely due to two important reasons. As composing with skill requires combining multiple skills and processes, age is important as development in these areas and maturity in integrating them together is necessary (Graham, et al., 1997). Second, with age comes increased experiences with writing and exposure to writing contexts, purposes, and processes (Nixon & Topping, 2001). In other words, though it is clear that age is an important factor to children's composing, the direct cause may be difficult to tease out.

Gender is another important demographic characteristic that emerged in the review of the existing literature. Girls appeared to outperform boys in writing (Berninger, et al., 2008) and in understanding genre (Kamler, 1994). Further, research indicated that girls performed better than boys in narrative tasks, however, not on other writing tasks (letter writing; writing vocabulary words; Jensen, 1990). Research also noted the contributions of gender, irrespective of other contributing factors (Puranik & Al Otaiba, 2012). The results that indicate that gender is an im-

portant factor is likely a sociocultural byproduct, not that girls are innately better writers than boys (Peterson, 2006).

Socioeconomic status has often arisen in educational research as a predictive factor in any number of subject areas or skills. Research reviewed for this inquiry also demonstrated that SES can contribute to children's early composing ability. Sices and colleagues (2007) found that SES, in addition to speech disorders and language impairments, contributed to composing insofar that children from low-SES backgrounds performed more poorly on writing tasks. Additional reviewed research provided support for the existence of this relationship between SES and composing (Coker, 2006; Puranik & Al Otaiba, 2012; Purcell-Gates & Dahl, 1991). Like gender, these findings suggest that these relations are likely contextual and experientially-based factors and not to be taken out of context (Dyson, 2010b).

In addition to demographic characteristics, research investigated the connections between children's early composing and contextual factors relating to children's parents, environments, teachers, and peers. Many of these factors, e.g. home literacy environment (HLE), could be confounded with demographic factors, e.g. SES, given that parents from low SES backgrounds often enact different types of literacy experiences for children than do parents from middle SES backgrounds (e.g., Van Steensel, 2006), leading to differences in exposure and experiences. Further, parents' perceptions of the child as a writer has an impact on the child's composing (Bradford & Wyse, 2013). These perceptions also likely have an impact on or are related to the home literacy environment. Research indicated HLE impacted children's narrative writing (Schickedanz, 2000). Further supporting research showed that HLE impacted the ways in which and the speed at which children developed writing (Copeland & Edwards, 1990). Additional research investigated parents and children in play contexts, specifically examining parents' scaffolding interac-

tions with their children during writing tasks (Aram & Besser-Biron, 2016; Leyva, et al., 2012; Neumann, Hood, & Ford, 2012; Neumann & Neumann, 2010) and indicated the significant role parents play in supporting children's composing and writing.

Research further indicated that children's teachers and classroom environments were contextual factors that additionally impacted children's composing (e.g., Schickedanz, 2000). Fox and Saracho (1990) found that rich writing environments, with plenty of materials, environmental print, and writing instruction and interaction led to more experimentation with composing. Coker (2006) found classroom literacy environment in kindergarten predicted children's first grade composing. More specifically, further research demonstrated the efficacy of writing and literacy interventions towards gains in children's composing (Raban & Coates, 2004). Children in experimental classrooms using writing workshop and/or interactive writing demonstrated significant growth in composing compared to children in control classrooms (Jones, 2015) and writing and technology interventions supported children's composing, particularly for children from multilingual backgrounds (Rowe & Miller, 2015). In addition to classroom environments and instructional practices, teachers' interactions were important factors in children's early composing; this was especially the case in research that operated from a sociocultural perspective (e.g., Dyson, 1988). Generally, composing appeared to be impacted by interaction with the teacher (Cazden, 1988; Daiute & Dalton, 1993; Sipe, 1998). Teachers additionally impacted children's composing by impacting children's motivations to write, either positively or negatively (Gutman & Sulzby, 1999; Nixon & Topping, 2001).

Lastly, peer interaction was an impacting factor on children's composing. Researchers contended that social interaction was incredibly important to composing and writing overall (Brock, 1990; Kissel, 2011; Sipe, 1998). Several interventions investigating the impacts of peer

writing strategies yielded positive results. Nixon and Topping (2001) examined the impact of an intervention where older students supported younger children in writing and found that these structured peer interactions yielded greater gains from pre- to posttest than children in the control context. Puranik and colleagues (2016) found that kindergarten writing was positively impacted by peer assisted writing strategies. Although the focus of this intervention was on transcription skills, the quality of children's compositions was also improved.

Task context, motivation, interests, and exposure. It is likely that children's previous experiences with writing, their motivations to use writing, and their interests are important in their ability to compose. As composing is an advanced process, it involves multiple skills acquired drawing from exposure and experience (Strickland & Morrow, 1989) and the motivation to persist based upon interest (Williams, 2011).

Further, early writing is task dependent; young children may exhibit higher writing sophistication with simpler tasks, such as name or letter writing, than they do with more difficult, open-ended writing tasks, such as composing, where they might revert to less conventional forms (Bus, Both-de Vries, de Jong, Sulzby, de Jong, & de Jong, 2001). Considering only composing task contexts, reviewed research indicated that task context might be impactful for young, early writers (Brock, 1990; Parker, et al., 2012). More specifically, children produced less sophisticated writing when composing a list compared to a personal letter (Zecker, 1999) and in another study, children wrote letters with greater spelling sophistication than they did narrative stories (Zecker, 1996). This suggests that a task with a more bounded form and clear path to writing leads to children to writing at a more sophisticated level. Even the task delivery may play a role: though they found it "less fun," children performed better on a traditional paper-and-pencil composing task than they did on the same task with a keyboard or digital tablet (Read, 2007). Im-

portantly, when writing sophistication (i.e., transcription skills) was not considered, the textual components and lexical structure of children's compositions in the written register (i.e., orally supplied responses to writing prompts) depended upon writing genre, e.g. narrative vs. expository and led to productions that were markedly different in terms of structural and syntactical elements (Pellegrini & Galda, 1986).

In addition to differences contributed by the task context which children are faced with in various research studies, reviewed literature suggested that writing motivation and children's interests play a role in children's compositions. Rowe and Neitzel (2010) explored differences in toddlers' approaches to writing based on their motivations to write and their play interests. They further noted that interests were largely shaped by individual, cultural, and social factors. Dyson (2010) similarly noted that composing was shaped by children's interests. Further research indicated that children's motivation to write led to varying levels of writing frequency and quantity (Wilson, et al., 2011). Sipe (1998) stated that composing processes were impacted by the level to which children were motivated to compose conventionally and persist with writing. Lastly, children who were intrinsically motivated, who were assessed in autonomy-supportive testing conditions compared to those who completed composing tasks in controlled and corrective contexts, produced more complex compositions (Gutman & Sulzby, 1999).

Finally, the degree to which children have been exposed to the process of composing and the purposes for which it is used could impact composing. Wollman-Bonilla (2001) stated that in order to compose, children needed not just graphic knowledge, but also knowledge of the functions and uses of writing as communication. Further, the extent of children's exposure to various writing genres and the uses for writing in different contexts was an important factor in their composing ability (Donovan & Smolkin, 2006).

In all, many disparate factors likely contribute to children's early composing abilities. A hypothesized, theoretical model explaining early composing using these factors and their interactions with one another is presented in Figure 1.

Figure 1. Theoretical Model of Children's Early Composing

Sociocultural factors

Individual characteristics

reading

exposure/ interests

motivation

Writing (transcription)

Early Composing

language

task dependence (genre knowledge)

self-talk

cognition
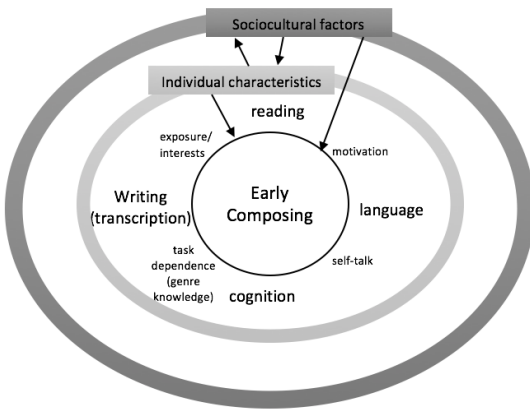
Given the findings of this review, the exact relationships between these factors and children's composing is, of yet, unknown. The uncertainty regarding the nature of the relationships of these impacting factors to children's composing is that they are difficult to tease out: they are, like composing itself, attributable to developmental, internal, and cognitive skills and processes and simultaneously attributable to sociocultural factors. These factors likely impact and interact with one another, making understanding the nature of these contributions to composing considerably complex. Further complicating matters and leading to this lack of clarity are issues surrounding the most efficient and effective ways of measuring early composing, which remain open to question.

Measurement of Early Composing

Ultimately, a shared understanding of what early composing is and the skills and processes that might constrain or support it was inconclusive given the reviewed literature. This is in large part due to issues of conceptualization of the construct and its measurement. Extant litera-

ture to date has used limited measures of composing and has not fully explored the best ways to encapsulate children's composing products and processes. Without a robust investigation into how best to measure composing by exploring children's composing using a variety of different tasks and measures and a variety of different methods for assessing these written products across time, composing as a phenomenon is difficult to understand or define.

Because this review intended to explore early and beginning composing more inclusively to consider a wider breadth of available literature, much of that which was included investigated early composing among slightly more conventional writers, e.g. kindergarteners and first graders. As such, several studies employed standardized writing measurements in order to encapsulate composing, which are typically normed for older children. The writing subtests used in these studies such as the writing samples task in the Woodcock-Johnson Revised (WJ-R; as used in Berninger, et al., 1997; Berninger, et al., 2006b) and the composing in the Test of Written Language (Parker, et al., 2015) both of which assessed children's composing in open-ended writing contexts. Several other studies used slightly more conscripted tasks. Two studies that used The Test of Early Written Language (TEWL) emerged in the various literature searches (Jones, 2015; Sices, et al., 2007). In order to capture children's composing, assessors gave test-takers three corresponding pictures and asked them to write a story using the pictures sequentially, whereas other studies used the writing fluency task from the WJ-R as a measure of composing (Berninger, et al., 1997; Berninger, et al., 2006b), in which children generate ideas and a written response based upon a picture prompt and three related words. Lastly, several other studies use measures whose relation to composing is tenuous: two subtests from the Weschler Individual Achievement Test (WIAT; Abbott, et al., 2010; Hooper, et al., 2011; Hooper, et al., 2013; Berninger, et al., 2006; Berninger, et al., 2008; Berninger, 2015) were used, the first, asks chil-

dren to write as many words as they can and the second asks children to blend two given sentences into one sentence with the same meaning. As such, these subtests appear to be assessing word writing or spelling and written syntax, respectively, rather than composing as children are not required to generate compositional ideas. These standardized assessments described here are likely too difficult for young writers because they require advanced transcription and syntactic knowledge as minimum requirements to be assessed.

Among younger writers (i.e. preschool-kindergarten), which were the express focus of this review, however, standardized measures of composing were much less frequent, and instead, researcher-designed composing assessments were used. Particularly with early writers, there was a preponderance of highly structured, contextual tasks that provide scaffolded prompts to reduce some of the idea generation required in composing as seen in open-ended writing tasks used with older students. A picture description task, for example, gives the child a specific and contextualized prompt to support his idea generation (Adams, et al., 2013; Coker, 2006; Dombek & Al Otaiba, 2016; Jones & Christensen, 2012; Puranik, et al., 2016; Rowe & Wilson, 2015). Further research used even more fixed and framed task contexts such as a sentence retell task, in which children write dictated sentences. This dictated sentence task is used alongside the picture description task (Puranik & Lonigan, 2011; 2014) or on its own (Besse, 1999; Raban & Coates, 2004; Razak, et al., 2010). In addition to contextual tasks, researchers also employed procedural writing tasks, where writing is utilized for a specific reason, usually unrelated to typical "school" tasks like narratives or opinion pieces. Studies have used letter writing to examine composing (Aram & Besser-Biron, 2016; Peskin, et al., 2016) or list writing (Leyva, Reese, & Wiser, 2012; Neumann, Hood, & Ford, 2010) or both (Stellakis & Kondyli, 2004) in order to provide meaningful writing experiences that are familiar to children.

Other reviewed literature used narrative and biographical writing tasks, e.g. opinion piec-es and personal stories. Some of these were scaffolded with picture and/or word supports and prompts (e.g., Bourke & Adams, 2003; Bourke & Adams, 2010; Millar, Light, & McNaughton, 2004; Pellegrini, et al., 1991;), others were more open-ended. For example, several studies uti-lized a task asking children to describe favorite parts of school or explain their opinions (Gra-ham, et al., 1997; Puranik & Al Otaiba, 2012; Puranik, Al Otaiba, & Ye, 2014). Considerable research used composing tasks that asked children to either compose a narrative based upon an oral story (Pinto, et al., 2012), a wordless picture book (Jensen, 1990; Lee, 1993) or a familiar situation (Bourke, et al., 2014). Further, several studies provided a completely open-ended nar-rative prompt (Bigozzi & Vettori, 2016; Pritchard, et al., 2009; Sulzby, 1996) or even completely open-ended prompts, free of any genre constraints (i.e., "You can choose to write about anything you like"; Cruikshank, 2001; Mackenzie, et al., 2015; Zecker, 1996).

In studies examining children's writing in naturalistic settings, often observational studies of classroom environments and teacher practice, researchers analyzed composing performance by looking at multiple samples overtime from varied settings and addressing various contexts and writing purposes (Dyson & Genishi, 1990; Nistler, 1990). Further, studies examined writing using curriculum-based measurement, corresponding to the participants' classroom experiences and current learning (Al Otaiba & Dombek, 2016; Parker, et al., 2016). Additionally, several ob-servational studies looked at the ways in which children co-constructed composing together in paired writing (Fisher, 1994; Pontecorvo & Morani, 1996).

Most research reviewed for the purposes of this inquiry investigated children's writing products and processes, requested that children demonstrate and enact composing and produce actual composing. In contrast, several notable studies used alternative measures. These tasks

assessed children's demonstration of orally produced written register – children's oral use of de-contextualized writing language in tasks that ask children to produce oral language that will be written down to be read later by others (Fang & Cox, 1999; Harste, et al., 1994; Purcell-Gates, 1991; Purcell-Gates & Dahl, 1994; Ruan, 2004). In this way, researchers could examine the degree to which children understood and could use composing language, completely removing the burden of transcription and writing conventionality from the child by merely focusing upon generating ideas and using language deemed writing-specific.

The tasks and the assessment tools that researchers have developed and used represent the first step in measurement. In addition, research reviewed employed various scoring and coding systems in order to interpret children's products, processes, and purposes. In several studies, composing was measured by children's ability to attend to and present conventions of text and writing in their compositions. For example, in their seminal work, Puranik and Lonigan (2014) measured children's generative knowledge by using two composing-related tasks (i.e. picture description and sentence retell, in which a child writes a dictated sentence), however, the scoring conceptualization relied completely on children's procedural knowledge of writing – that is, their spelling and letter formation ability and use of print conventions such as linearity and directionality. In this instance, the researchers used dichotomous scoring of particular transcription-related features attending to whether these features were present or absent in children's writing. This measurement method offers a comprehensive view into the complexity and developmental level of children's writing using decontextualized writing products. However, this form of measuring children's composing is potentially limited in important ways – largely, the use of transcription skills as an indicator for composing ability to the exclusion of other factors. While not explicitly stated in this study, composing was seen as inseparable from children's transcription

skills and understanding of print concepts. In this case, children's conventionality of writing represented their composing ability – it was not a singular aspect of it, but was, theoretically, a part representing the whole (Rowe & Wilson, 2015).

Many other studies also used children's use of writing conventions in their scoring of children's compositions as demonstrated by their letter formation, their spellings, and the signs of their understandings of concepts related to print and writing. Often these studies employed writing phases as opposed to dichotomous scoring (Besse, 1996; Bradford & Wyse, 2013; Chi, 1988; Dahl & Freppon, 1994; Graham & Harris, 2006; Hoflundsengen, et al., 2016; Jensen, 1990; Jones & Christensen, 2012; Pellegrini, et al., 1991; Yaden & Tardibuono, 2004). In addition to conventionality of form, other studies employed a scoring method focused upon writing complexity or quantity in terms of letters, words, and t-units (Adams, et al., 2013) or total numbers of words and sentences (Puranik & Al Otaiba, 2012; Puranik, et al., 2014).

The degree to which children can match their oral and written language outputs in composing task contexts was another direct assessment method used in the literature. This scoring strategy can be seen as an attempt to include more variability as it is not wholly dependent upon children being able to write conventionally. As writing requires an understanding of text as language and that oral language can be represented with writing, children who are able to match their written and oral language may be demonstrating higher levels of composing. Research has sought to investigate composing from this vantage. Gerde and Bingham (2013) designed a contextual writing task, in which children were asked to write in a speech bubble what they believed one character was saying to another. Children were then asked to repeat what they had written in order to determine the equivalency of their oral and written messages. It is critical to note, in this line of research, as a major concern is the degree to which children's oral and written responses

are similar, children are still expected to write conventionally to perform well on these tasks. Thus, despite the fact that measurement of this nature did not explicitly examine transcription skills on their own, it requires children to be display some degree of fluency so that the assessor can understand connections between written and oral language products. Thus, considering children's oral language in tandem with written responses, involved analyzing children's writing complexity and required, to a certain degree, that children are using sophisticated writing skills. As a result, measurement of this variety suffers from the same potential limitations as those explicitly focused upon transcription skills – children were only seen as skillful composers when the assessor could understand the relations between what they wrote and what they said. Avoiding this issue, other research examined children's composing by evaluating children's oral language during their writing process (Dyson, 1988; Mulhern, 2002), however it is unclear how these utterances appropriately reflect composing ability as there is no way to verify it by solely examining the writing products children generate.

As reading and writing are inextricably linked, developing simultaneously, and symbiotically in nature (Berninger, et al., 2002; Pinto, Bigozzi, Gamannossi, & Vezzani, 2012; Puranik & Lonigan, 2012; Teale & Sulzby, 1986), researchers have used children's reading skills to better interpret and understand their composing skills. Although the exact relations between early composing ability and reading are unknown, one common way to measure a child's composing among the reviewed literature was to examine his ability to both encode (write) and decode (read) his ideas. In a study conducted by Leyva, Reese, and Wiser (2012), the researchers examined this very phenomenon by first attempting to understand the variability in children's writing (encoding) but also the ways in which the child decoded his own ideas. An important element in the design of the measurement referenced here is that children were asked to write and after sev-

eral minutes had passed, asked to read back what they had written. In this type of inquiry, encoding and decoding are given equal weight, indicating the researchers' perception of concurrent development of reading and writing. Several other studies engaged in similar coding and scoring practices by investigating children's writing and their ability to read the writing they produced (Cioffi & Carney, 1997; Jensen, 1990).

Another way in which composing has been measured to date is in the recent work of Pinto, Tarchi, and Bigozzi (2015) in which the researchers attempted to examine the narrative writing abilities of native Italian-speaking children ages five to seven. The researchers developed scaled systems to understand the structure, cohesion, and coherence of children's narrative writing in response to an aural storytelling experience. Writing structure referred to the complexity of the child's written narrative and the ways in which it attended to all portions of the story. Structure was scored using a five-point scale ranging from an extremely limited telling in which the child provided a simple description or a list to a complete story including characters, setting, problem, and resolution. Coherence referred to adherence to writing standards and syntactical knowledge. Coherence was scored using low, medium, and high subsets of the population, comparing the degree to which children's composing contained incongruities. Cohesion referred to a child's use of connective language and conjunctions, and again was scored using low, medium, and high prevalence of cohesive language compared to others in the sample. Several of the other studies reviewed for this inquiry used the same coding scheme (Bigozzi & Vettori, 2016) or similar scoring systems, typically with narrative writing tasks. Many studies examined composing outputs by looking for the content that children included and the organizational strategies they employed in their writing (Bourke & Adams, 2003; Bourke & Adams, 2010; Coker, 2006;

Nixon & Topping, 2001; Yates, et al., 1995). Scoring of this kind was typically used with older children who were more skilled in writing as it would likely have floor effects with early writers.

Several studies offered more comprehensive composing measurement that is sensitive to variability in composing skills and development, Rowe & Wilson (2015) examined children's composing longitudinally from the time children were two until the age of five. In this study, composing included writing form (i.e. taking into account both writing complexity and transcription skills), directionality (i.e. concepts of print/writing), intentionality (whether the output is symbolic of the child's desired message), and task/message match (similar to oral language measures of composing). While this study was somewhat unique in offering a comprehensive and integrative coding system appropriate for young writers, several other studies enacted research that seemed developmentally appropriate by exploring children's developing knowledge around the difference between drawing and writing (Akita, et al., 2007; Chen & Zhou, 2010). In these studies, researchers examined the differences between products when children are asked to draw and those when they are asked to write and exploring children's understanding of their decontextualized products as either drawing or writing.

Despite the preponderance of literature that returned in various searches, there was no decisive and shared understanding of the most efficacious ways to measure composing in young children. This is confounded of course, by the inherent inconsistencies in measurement making it exceedingly difficult to examine the construct across studies, with multitudes of different task contexts and scoring systems, and among children of varied ages and developmental levels, despite constraining searches to a finite age range. Reviewed literature presented various task contexts and scoring systems; however, how these different methods related to each other was unclear. Despite the considerable research reviewed, few studies attempted to explore composing

in a variety of task contexts and scoring systems to better understand appropriate approaches to measurement in young children. Further, what is known about writing, early composing, and how to measure it, largely centers on children's transcription skills – handwriting, the ability to write names and correctly form letters, and spelling. Even when composing was of focal interest, much of the current research seemed to indicate that in order to compose, children must demonstrate conventional writing in order to be successful. This implies the presence of a composing threshold, before which, children are unable to compose, and after they have acquired sophistication in writing, they are able to begin composing. Arguably, however, like emergent literacy more generally, children are acquiring the necessary skills for composing and making composing attempts long before they can conventionally write. Thus, research with a clear and robust understanding of the construct of composing, examining it in young children using inclusive assessments and scoring, and elucidating the relations between composing and other skills and processes is necessary moving forward.

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2 EXAMINING EMERGENT COMPOSING PERFORMANCE IN PRE-KINDERGARTEN: TOWARDS A COMPREHENSIVE UNDERSTANDING OF WRITING

As one key emergent literacy skill (Teale & Sulzby, 1986), research around early writing has grown significantly in recent years. Like emergent reading skills, early writing is predictive of later outcomes tied to academic success (Aram, 2005; Hammill, 2004; Hooper, Roberts, Nelson, Zeisel, & Kasambira Fannin, 2010). Early writing has been theorized to involve the coordination of transcription skills (e.g., handwriting and spelling) together with composing, the ability to translate ideas into writing (Kaderavek, Cabell, & Justice, 2009). Despite intensified interest in investigating children's early writing development, the majority of studies of this nature have focused mainly on children's ability to use proper form (handwriting), including name writing (Gerde, Skibbe, Bowles, & Martoccio, 2012; Welsch, Sullivan, & Justice, 2003) and letter writing (Drouin & Harmon, 2009; Molfese, et al., 2010; Puranik, Petscher, & Lonigan, 2013), and their orthographic knowledge (invented spelling; Clemens, Oslund, Simmons, & Simmons, 2014; Ouellette & Sénéchal, 2008; Pendergast, Bingham, & Patton-Terry, 2015; Pinto, Bigozzi, Gamannossi, & Vezzani, 2012). These skills are foundational to later skilled writing (Dinehart, 2015; Ehri & Roberts, 2006), however, they may not fully encapsulate children's early writing abilities and they do not account for children's ability to utilize writing as it is intended to be used – as a means of communication.

In the understudied area of early composing, a uniform definition of its nature and a shared understanding of how to measure this construct in young children is lacking. To date, several studies have included composing tasks and attempted to interpret children's writing outputs in a variety of ways including examining children's transcription skills and writing com-

plexity, ability to encode and decode writing products, the connection between oral and written representations of products, level of discourse, use of written register (i.e. oral language demonstrating knowledge of language conventional for writing), or a combination of the preceding (Gerde & Bingham, 2013; Puranik & Lonigan, 2011; 2014; Quinn, Bingham, & Gerde, 2016; Rowe & Wilson, 2015). Despite these attempts, a shared understanding of the nature of composing and valid and determinative methods of scoring early composing have not yet been thoroughly investigated in the literature to date. In other words, there appears to be little consensus of the nature of early composing and how to most effectively measure it. To address these two issues, the purpose of this study is to better understand early composing by examining children's written products in several task contexts, using a variety of different scoring conceptualizations and systems, and the contributions of other related skills.

Conceptual Framework

Two prevailing understandings of the nature of early writing will conceptually ground this study. These constructions (Kaderavek, et al., 2009; Puranik & Lonigan, 2014) demonstrate that early writing is comprised of smaller component skills. Kaderavek and colleagues (2009) provided a conceptual framework for understanding early writing as being comprised of handwriting, spelling, and composing component skills. In this case, handwriting is the ability to properly form letters, tapping into children's cognitive, fine motor and visual motor skills (Rosenblum, Weiss, & Parush, 2003). A child's handwriting ability is often assessed through name and letter writing tasks (Gerde, et al., 2012; Puranik, et al., 2013). Spelling, comprised of children's orthographic, phonological, and graphophonemic knowledge, represents the ability to identify and use necessary letters and sounds for writing (Oullette & Sénéchal, 2008), often as-

sessed using CVC word spelling tasks. Lastly, composing represents the ability to create ideas and translate these ideas into written text (Graves, 2003).

Another current framework of early writing theorized by Puranik and Lonigan (2014) posits that early writing is comprised of three knowledge streams, bearing some resemblance to the previous construction but deviating in critical ways. This theoretical construction includes procedural knowledge, largely comprised of transcription skills, generative knowledge, which is akin to composing, and conceptual knowledge that encompasses a child's understanding of concepts related to print and writing. The inclusion of conceptual knowledge indicates the importance of children's understanding of the ways in which writing works, which has already been shown to be predictive of later writing performance (Hooper, et al., 2010) and an important, foundational early writing skill (Puranik & Lonigan, 2011).

Theoretical Framework

As demonstrated by the preceding conceptual understandings of early writing, it is a complex act that requires children to incorporate different skills. Further, writing development is contingent upon internal, cognitive processes but also affected by external, environmental stimuli such as tangible supports within the child's environment (i.e. materials and opportunities to use those materials) and supportive instructional interactions (Gerde, Bingham & Pendergast, 2015). As such, in addition to the conceptual frameworks that provide a foundational understanding of early writing for the present study, an additional developmental theoretical framework will also undergird this study: Dynamic Systems Theory (DST), which posits that development is a complex, epigenetic phenomenon in which overlapping, related behaviors occur and lead to changes in development. DST theorists posit that development is nonlinear and constructions of developmental processes that are unitary or contain one cause are insufficient in explaining the true,

complex nature of these processes (Thelan, 2005), thus multiple measurements, ideally collected within multiple, shorter time frames, may be necessary to fully encapsulate developmental constructs.

Literature Review

Writing in preschool is important – research shows that early writing is predictive of later performance (Aram, 2005; Hooper, et al., 2010; Hammill, 2004). As such, research interest in early writing has increased in recent years. Writing has been demonstrated to develop in a number of different ways during the preschool years preceding formal school entry. Research has theorized the skills comprising early writing (Kaderavek, et al., 2009; Puranik & Lonigan, 2014) and has sought to determine how those skills might develop over time, indicating that particular skills and traits develop in largely predictable ways (Diamond, Gerde, & Powell, 2008; Puranik & Longian, 2011). While extant literature has sought to understand the nature and development of early writing in preschool, there are indications that though early writing development appears to progress similarly across individuals, the ways in which it progresses, on an individual level, are nonlinear (Rowe & Wilson, 2015).

To date, predominant research in early writing is somewhat limited in terms of its measurement of early writing: in many studies, name writing (Diamond, et al., 2008; Welsch, et al., 2003), letter writing (Molfese, et al., 2010; Puranik, et al., 2013), or word writing (Clemens, et al., 2014; Oullette & Sénéchal, 2008) act as either proxies serving for global writing development or are the only aspect of early writing that is assessed or examined.   While effectively assessing children's transcription skills, these tasks do not uncover any information about children's abilities to generate ideas and translate those ideas into written text, in other words, compose. However, there is existing research that has assessed children's early composing. For ex-

ample, Puranik and Lonigan (2011; 2014) explored children's generative (i.e. composing) abili-

ties using two tasks – sentence retell (writing a dictated sentence) and picture description. Simi-

larly, in the work of Rowe and Wilson (2015), a picture description task served as the only

measure of writing ability. Other current and relevant studies appear limited in terms of their ap-

proaches to early writing assessment, particularly in regards to early composing.

Further, existing literature exploring early composing does not offer a shared understand-

ing of how best to evaluate children's writing products. While they obtained generative writing

samples from the children in their study, Puranik and Lonigan (2011; 2014) scored and evaluated

children's generative products based on their ability to use transcription skills and knowledge of

print and writing concepts while engaged in generative tasks. The researchers scored children's

generative writing products by exploring the presence or absence of transcription features (e.g.

left-to-right orientation; use of invented spelling). Statistically, the authors' confirmatory factor

analysis models confirmed that their theorized construction of early writing was a good fit de-

spite the fact that children's transcription (i.e. procedural knowledge) and their composing (i.e.

generative knowledge) were scored using nearly identical methods. Theoretically, as transcrip-

tion skills are critical and serve as foundational to other writing, this measurement conceptualiza-

tion could be considered appropriate (Dinehart, 2015; McBride-Chang, 1998), however other

research has investigated early composing using alternative methods.

Further research indicates that including a dimension of oral language alongside chil-

dren's transcription skills when exploring early writing may be beneficial to understanding the

differences in children's composing skills. Gerde and Bingham (2013) collected writing samples

and asked children to explain what they had written in a contextual task. Children were presented

with a picture of two characters and asked to record what they thought one character might be

saying to the other. In this case, composing was measured by the writing demonstrated. Although still somewhat dependent upon transcription abilities, it requires children to discuss the process of writing in that they were required to generate an idea, write, and subsequently translate their writing output. This scoring conceptualization may offer a more multidimensional construction of coding above and beyond transcription skills. Somewhat similarly, Leyva, Reese, & Wiser (2012) asked children to decode their written responses to a procedural task, that is, a task that required children to write towards a specific purpose representing writing in familiar and useful contexts. The researchers asked children to write a grocery list based on items they were shown. In this instance, composing was measured by the degree to which children could make meaning in their writing but also the degree to which they could extract meaning from what they wrote. However, as children were given specific items in specific amounts and expected to write correspondingly, the task had little to do with children generating their own ideas and translating them into text. The composing scoring conceptualizations theorized by Gerde and Bingham (2013) and the work of Leyva, Reese, and Wiser (2012) are limited in similar ways – first, they require children to demonstrate writing complexity in order to compose and second, these measures have established skills believed to be important for composing (i.e. oral language and encoding/decoding, respectively). However, these methods of assessing and scoring composing may be tapping into something else entirely, i.e. working memory. Further, the coding system of Leyva, et al. (2012), first developed to score children's notating abilities, was heavily structured in that children were provided with set items and asked to compose a list based on those items, and not originate their own ideas, and thus may be inappropriate to fully encapsulate composing, if composing is defined as translating one's ideas into writing (Graves, 2003).

In the previous studies, the tasks and scoring used to assess children's early writing are heavily dependent upon children's transcription skills and the complexity of their writing outputs. In order to attempt to alleviate some of these issues, the work of Quinn and colleagues (2016) uses a coding system that analyzed composing based upon similar considerations – oral language, written language, and the relationship between these two, albeit in an expanded form. Additionally, unconventional forms of writing, e.g. drawing, were considered appropriate and when relevant to the task context, were scored equitably as they demonstrate children's use of writing, in whatever form, as a manner of making meaning. Relevant other research has considered drawing as representative of children's composing abilities (Burgess-Macey, 1999; Coates, 2002; Dyson, 2010; Edminster, Staples, Huber, & Garrett, 2013).

Extant literature has examined composing through a variety of different lenses attending to various domains, features, and exhibited skills present in children's composing. While these existing inquiries have provided valuable insight into what early composing might conceptually involve and how to measure composing, the preceding studies may not adequately capture the complexities and dynamic nature of children's early writing – which likely involves the incorporation of manifold skills and processes, becoming less and more important depending upon development and the nature of the skill. For example, highly constrained (Paris, 2005) skills, such as writing linearly from left to right will develop and remain constant thereafter. Meanwhile, unconstrained skills, may be used less strategically in early composing but will continue to develop as children's constrained skills become more automatized (Scarborough, 2002). Writing is a dynamic and complex phenomenon, and research and measurement would ideally encapsulate these complexities.

Rowe and Wilson (2015) attempted to examine children's early writing development from a dynamic, comprehensive perspective. In so doing, they investigated writing development in several different ways rather than focusing on one particular demonstrated skill or process. The researchers examined children's transcription skills and knowledge of print and writing concepts, writing complexity, children's ability to match written and oral responses, and the child's intentionality in writing – meaning, the level to which writing matches the intended message. This study offers a more dynamic approach to children's early writing development by examining development across time, from when children were two years old until the age of five. To make both the task and the method of assessing children's writing appropriate for all children, regardless of age, the researchers used an inclusive and simplified measure that would capture variability. They found significant differences between children in terms of growth and within-child variability across time. This study was limited as writing was assessed using only one task. As such, less is known about the transference of skills and behaviors dependent upon task context. While the researchers were interested in understanding children's writing from a dynamic perspective, they do not account for the ways in which children might demonstrate different writing competencies contingent upon the task.

While extant literature has laid the groundwork for foundational understandings of composing, no research to date has sought to understand how these understandings of composing might relate to one another and to measurements of other skills. As such, the current inquiry will seek to address the following questions:

1.   Using current, theoretically- and conceptually-supported methods of assessing and scoring early composing, what is the nature of children's composing at the end of the Pre-K year across a variety of writing tasks and contexts?

2. How do various methods of scoring composing relate to one another across tasks?

3. How do tasks addressing various writing contexts (e.g. procedural, contextual, narrative) relate to one another?

4. What is the nature of the association among various methods of capturing children's early composing to measures of transcription skills, emergent literacy, expressive and receptive language, and executive function?

Method

Participants

The participants who took part in this study were drawn from two larger multisite studies in a metropolitan area in a large city in the Southeast. These larger studies investigated the effects of a language and literacy-focused intervention among preschool and prekindergarten classrooms (i.e. ages 3-5); Study 1 was in Year 5, Study 2 was in Year 3. Data was collected from twelve different sites and 24 classrooms. Participation in each classroom ranged considerably (n per classroom ranging from $1 - 19$) with an average of 6.67 students per classroom ($SD = 4.59$). All sites, regardless of overarching organization or location, served largely low-income populations. In total, 160 prekindergarten-aged[1] (Pre-K) children (ages 4 and 5) were assessed. This subsample was chosen as Pre-K children were likely further developed in their writing and were likely to show more skill variability in terms of written complexity and sophistication due to age, development, and exposure (Puranik & Lonigan, 2011) but also in their understanding of the relation between written and oral language (Treiman, Kessler, Decker, & Pollo, 2016). Because

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[1] Based on moderate effect sizes defined by Cohen (1988), power analyses indicated samples of 30 ($d_z = .5$, $1 - \beta = .8$), 108 ($f_z = .25$, $1 - \beta = .8$), and 115 ($f^2 = .15$, $1 - \beta = .8$) would adequately address the inquiries of research questions 2, 3, and 4, respectively. Despite the fact that power analyses indicated smaller sample sizes were necessary for the research inquiries proposed in this study, a larger sample was deemed appropriate in order to account for potential missing data (i.e. only consider cases who received the full test battery).

data was collected at the end of the Pre-K year, participants were an average of 59.39 months old (*SD* = 5.90). The sample was comprised of 48.6% boys and 51.4% girls. Children assessed represented mostly diverse ethnic and racial backgrounds, 66.3% African American, 11.9% Latino/a, 8.1% White, 1.3% Asian-American, and 12.5% mixed background or unknown. While not a particular foci of the present study, students who were identified as dual language learners were included for analysis (4.4%), as were students who had been referred to special services (5.6% of total sample; including speech language pathology, hearing, and cognitive-based services), were included in analyses as long as they were able to complete the given assessments. Children who were unable to receive, understand, and follow test instructions, as a result of language or other need, were not assessed and were not included in the study.

Procedure

Testing. Six trained graduate research assistants and the author assessed all children. Graduate assistants were trained during two-hour training sessions in which they practiced administering the assessments and coded and scored all assessments for reliability purposes. Writing samples from a pilot study were used for practice coding.

As the testing battery included several different assessments, tests were broken into sessions to avoid testing fatigue. Sessions were administered on different days within a two-week period. Tasks were counter balanced so that children were not fatigued in particular skill areas. For example, measures assessing similar skills and processes (e.g. various composing tasks; language measures) were divided between separate test sessions. Assessments and testing sessions were conducted in random order. Children were assessed privately, in quiet areas in their respective schools outside of their classrooms.

Measures

  Writing measures. During the spring semester of the academic year, children were assessed in composing and other related measures. In all composing measures, children were given clear prompts and asked to write. After children completed the writing for that task, they were asked to recall what they wrote. Assessors recorded oral responses and made general comments and took anecdotal notes about children's writing such as hand preference, page orientation, order of lettering, directionality, horizontality, and task-message match.

  Children's composing was assessed using a number of tasks. As best instructional practices indicate the need for demonstrating writing for a variety of purposes (Gerde, Bingham, & Wasik, 2012), writing tasks addressed a number of different contexts in order to allow children to comprehensively demonstrate writing for varied purposes. This is critical as no known research to date has compared preschool-aged children's performance in early composing tasks to determine which task(s) might be most appropriate while simultaneously providing information regarding ability. The writing task contexts include:

  Contextual composing. (writing towards a specific purpose, Appendix A.1). To understand children's ability to write towards a specific purpose, they were given a picture of two raccoons, mother and baby, with a speech bubble and asked to provide an oral and written response that would fit in the speech bubble (Gerde & Bingham, 2013). This measure was intentionally designed as a scaffolded, relatively close-ended task. By structuring the assessment with a picture and specific prompt provides children a specific context for writing and limits appropriate interpretations of what is happening. Previous research documents that this task supports children's composing, allowing them to use more advanced writing than they would with a more open-ended task (Gerde & Bingham, 2013). As this measure is relatively new and dependent

upon scoring procedure, validity and reliability is unknown to date. Research demonstrates that it is concurrently related to measures of language and literacy (Quinn, et al., 2016).

   Procedural composing. (writing that is technical and strategic). Children were asked to complete two procedural tasks; first, they were asked to write a birthday invitation and provide accompanying oral output (Skibbe, Bindman, Hindman, Aram, & Morrison, 2013). Validity and reliability of the task as a measure of children's independent composing ability is not yet established.

   In a second procedural task, children were asked to create a shopping list for necessary supplies for the birthday party, providing both written and oral outputs (Leyva, et al., 2012). From the original research, this measure had high internal consistency (Cronbach's α = .92). The authors did not discuss external validity as they were likewise exploring parental writing support.

   In these procedural measures, children were (a) asked to describe what they would write first, (b) given the opportunity to write, and then (c) asked to decode their writing. The impetus for the initial oral output was that as these tasks are less scaffolded than the Raccoon/contextual task, children may have needed more support to write.

   Narrative composing. (writing with an understanding of story structure, Appendix A.2). Children were provided with four pictures that when sequenced correctly would tell a story about a girl riding her bike, injuring herself, and being attended to by her mother. Children were asked to sequence the pictures first. The act of sequencing, theoretically, allowed space for children to become more familiar with the pictures and served as the planning time for this task (as with the procedural tasks). Once sequenced, the assessor made adjustments so that pictures are in the correct order. Subsequently, children were asked to write about each picture to tell the story using

individual sentence strips. Children additionally provided an oral output to accompany each story scene.

       Early writing measures. - In addition to composing measures, other writing data was collected. These measures could impact children's overall ability to compose text thus they should be accounted for. These measures include name writing (adapted from Diamond, et al., 2008), letter writing (adapted from Gerde, et al., 2015), and invented spelling/word writing (adapted from Invernizzi, Meier, Swank, & Juel, 1997).   Name writing was scored on a 6-point scale accounting for children's ability to write their name conventionally (0 refusal, 1 scribbling/drawing, 2 linear scribble writing, 3 letter-like shapes, 4 letters and letter-like shapes, 5 partial name, 6 name spelled correctly; adapted from Diamond, et al., 2008). For the letter writing assessment, participants were asked to write ten letters, those children are most exposed to, and each letter was scored on a 5-point scale (0 refusal, 1 scribbling/drawing, 2 linear scribble writing, 3 letter-like shape, 4 incorrect letter, e.g. wrote G instead of J, 5 correct letter; Gerde, et al., 2015). Scores were summed to arrive at a combined letter score out of 50. In the invented spelling measure, children were asked to spell 5 CVC words (sad, hug, lip, net, and job; Invernizzi, et al., 1997). Spelling attempts were scored on a 7-point scale (0 refusal, 1 scribbling/drawing, 2 linear scribble writing, 3 letter-like shapes, 4 letters and letter-like shapes, 5 letters with beginning invented spelling, i.e. initial or salient sound, 6 letters with advanced invented spelling, i.e. initial and final sound or initial and other salient sound, 7 word spelled correctly; adapted from Gerde, et al., 2015). Children's spelling scores were averaged to arrive at their final spelling score. Previous research indicated strong reliability among transcription skills (name, k = .90, Diamond, et al., 2008; letter, Cronbach's α = .91, Gerde, et al., 2015; word, $r =$ .99, $p < .01$; Invernizzi, et al., 1997). For the purpose of this study, graduate researchers study-

ing education and child development were trained in scoring procedures in order to reliably code transcription scores as defined by the scales above. In order to determine reliability in the current study, after training coders in name, letter, and word scoring, 20% of the sample ($n = 32$) was randomly pulled. The author as well as one of the trained graduate researchers independently assessed writing samples and exhibited strong interrater reliability (name $k = .875$; letter $k = .815$, spelling $k = .925$).

Other measures. In addition to early writing measures, a number of potentially related measures were collected in order to determine their contribution to composing and how children's performance, as representative of their global skills, may affect various early composing scoring systems.

Receptive vocabulary. The Peabody Picture Vocabulary Test, Fourth Edition (PPVT-4; Dunn & Dunn, 2007) was administered as a measure of children's receptive vocabulary. This standardized assessment is normed for use with any and all age groups, ranging from two and a half year olds to adults. While the PPVT-4 is a measure of children's vocabulary, performance on it is moderately to highly correlated to other dimensions of language (Dunn & Dunn, 2007) and as such, is often used as a general language measure. In this assessment, children chose between four displayed images to match the target vocabulary word (e.g., "Point to the car"). The test is comprised of 228 items, however, children were assessed up until they reach a specific performance ceiling, after which point, the assessment was suspended. Standardized scores used for analyses are based on a normative sample ($m = 100$, $SD = 15$). The PPVT-IV exhibits strong internal consistency (rs ranging .89 - .97). The researchers also demonstrate external validity by demonstrating the relations between it and other various language measures, e.g. Expressive Vocabulary Test, Second Edition (EVT-2; rs ranging .80 - .84; Dunn & Dunn, 2007).

A further measure of receptive language was also used to assess children's receptive syntactical understanding. Children were assessed in the Sentence Structure subtest from the Clinical Evaluation of Language Fundamentals – Preschool-2 (CELF-P2; Semel, Wiig, & Secord, 2004). In this measure, the child is presented with four picture stimuli and asked to identify the target given a particular sentence, with each of the four being similar but varying based on syntactical characteristics (e.g., "point to 'the girl showed the dog the cat'"). In the Sentence Structure subtest, ceiling rules predicate that the test should be discontinued after five consecutive incorrect responses. The subtest reports scaled scores ($m = 10$, SD = 3). Finally, this subtest demonstrates adequate reliability, measured by split-half processes ($r = .80$) (Semel, et al., 2004).

Expressive language. In order to counterbalance the receptive tasks, an additional expressive subtest from the Clinical Evaluation of Language Fundamentals – Preschool-2 (CELF-P2; Semel, et al., 2004), a general language measure designed for children ages three to seven, was administered. The Expressive Vocabulary subtest is pulled from the larger Core Language test. In this task, children are shown a picture and asked to verbally identify the image (e.g. "What are these?" "Binoculars."). The Expressive Vocabulary uses ceiling rules (seven consecutive incorrect responses) and leads to scaled scores ($m = 10$, $SD = 3$). The Expressive Vocabulary subtest generally demonstrates satisfactory reliability ($r = .82$). While individual subtests were not compared to external measures to indicate validity, the Core Language Score on the CELF-P2, including Sentence Structure (above), Expressive Vocabulary, and another subtest not used in this study, the Word Structure subtest, was satisfactorily correlated with the Preschool Language Scales, 4th Edition ($r = .72$; PLS-4; Zimmerman, Steiner, & Pond, 2002) demonstrating external validity.

Executive function. As a global measure of executive function, the Head-Toes-Knees-Shoulders assessment (HTKS; Cameron Ponitz, et al., 2008) was administered to better understand children's attentional control and general self-regulation skills. Executive function is an umbrella term used to describe a number of different cognitive processes used to reach a particular goal. Typically, these are described as multiple, separable but related processes. While many available measures assess specific EF processes (i.e. attentional control, working memory, etc.), research indicates that component-specific tasks are beyond the reasonable scope of preschool-aged children's development, thus, a global measure of EF such as HTKS is preferable (McClelland & Cameron, 2012). In this assessment, children are asked to complete tasks in direct opposition of the instructions spoken by the assessor (for example, when told to touch his shoulders, the child is expected to touch his knees, and vice versa). In a more advanced trial, head and toes are additionally incorporated into the task, however, children can reach the ceiling before this point, concluding the assessment. This task addresses children's working memory, inhibitory control, and attentional control. There were thirty trials and the assessment is scored out of sixty, as in each trial, children are given two points for correctly adhering to the task rules and one point for self-correction. Considerable research has demonstrated the reliability and validity of HTKS as a measure of EF (McClelland, et al., 2014; Ponitz, et al., 2008).

Emergent literacy – prereading. To measure specific prereading abilities of emergent literacy, two subtests from the Test of Preschool Early Literacy (TOPEL; Lonigan, Wagner, Torgesen, & Rashotte, 2007), a standardized emergent literacy assessment, were administered.

Print knowledge. The Print Knowledge subtest of the TOPEL was administered to better understand children's knowledge of print and the alphabet. This 36-item subtest combines multiple items addressing various skills, processes, and understandings related to emergent literacy.

This includes identifying letters and letter sounds from four choices (e.g. "Which one makes the /b/ sound?"), naming letters and letter sounds (e.g. "What is the name of this letter?"), and demonstrating knowledge related to concepts of print (e.g. "Some children wrote stories, which one is the longest story?").

Phonological awareness. In addition, the Phonological Awareness subtest from the TOPEL was administered (Lonigan, et al., 2007). This task includes 27 items tapping into phonological skills such as elision (e.g., "Point to sunflower without flower" or "Say raid without /d/") and blending (e.g. "Point to the picture these words make – star, fish" or "What words do these sounds make - /h/, at"). In both elision and blending exercises, children are first given items with stimulus pictures, then some without. The TOPEL, comprised of the Phonological Awareness, Print Knowledge, subtests along with another subtest that was not used in this study, Definitional Vocabulary, has high internal consistency (.96 - .98) within subscales and validity with the Test of Reading Ability (TERA-3, Reid, Hresko, & Hammill, 2001) (Lonigan et al., 2007).

Coding/Scoring

All composing tasks, including contextual, procedural, and narrative tasks, were coded/scored using four different methods. Based on the work of Puranik and Lonigan (2011, 2014), outputs were dichotomously scored according to the presence/absence of particular transcription features, demonstrating children's conceptual and procedural knowledge as it relates to composing. These features included linearity, horizontality, left to right orientation, segmentation (letter forms), use of simple characters, use of random or correct letters, use of invented spelling, etc. As specified in the original research, these features were ordered in terms of complexity/developmental progression (as specified by Puranik & Lonigan, 2011), and the present

features (i.e., score of 1) were summed to reach a final score out of seven. Across all task contexts, the Puranik and Lonigan (2011; 2014) coding yielded strong reliability when 20% of the sample was randomly coded independently by the author of the present study and a trained coder (Procedural task 1 $k = .93$, Procedural task 2 $k = .86$, Narrative task $k = .86$, Conceptual task $k = .91$).

Children's ability to translate oral to written language was assessed in all composing tasks using a scoring method created by Gerde and Bingham (2013) wherein children's oral and written outputs are separately scored 0-2 (refusal, unrelated, and related to task, respectively). Finally, the relation between the oral and written outputs is scored from 0-2 (refusal, unrelated, related). These three scores are summed to arrive at a final score for composing. Additionally, children's writing was analyzed according to a phase-like structure, with stages: 1 (child writes his/her name), 2 (draws or scribbles), 3 (writes letters or letter-like shapes), 4 (uses beginning invented spelling, i.e. one salient sound is written for each word), 5 (uses advanced invented spelling, i.e. more than one salient sound is written for each word) (Gerde & Bingham, 2013). In this particular scoring system, children could be in more than one stage simultaneously, however, their highest present stage was used for analysis. Children's outputs in response to all four tasks were coded using these methods. A random sample consisting of 20% of the full sample, was coded by the author and a trained coder and strong interrater reliability was maintained across task contexts in terms of total composing score (Procedural task 1 $k = .78$, Procedural task 2 $k = .83$, Narrative task $k = .75$, Conceptual task $k = .73$) and highest level of sophistication demonstrated in the writing sample (Procedural task 1 $k = .79$, Procedural task 2 $k = .80$, Narrative task $k = .82$, Conceptual task $k = .80$).

In addition, an expanded form of Gerde and Bingham (2013)'s coding scheme was employed (Quinn, et al., 2016). In this scoring system, children's samples were coded dichotomously (1 = present, 0 = absent; adapted from Puranik & Lonigan, 2011) for features relating to translation, adherence to task, and number of ideas, among other items (Quinn, et al., 2016). Unlike the other coding schemes used for the purpose of this study, in order to fully encapsulate children's ability to use writing to make meaning in any possible form, drawings were considered as acceptable as conventional writing insofar as it addressed the demands of the task context. Scores were summed. Of the full sample, a random 20% was selected and coded independently by the author and a trained coder and interrater reliability was moderate to strong (Procedural task 1 k = .94, Procedural task 2 k = .86, Narrative task k = .72, Conceptual task k = .86).

Rowe and Wilson (2015) conceptualized a scoring system that combines many of the elements from previous scoring systems and was used to score each of the composing tasks in the present study. The researchers originally coded children's writing in four different categories, each category with comprehensive and detailed skill levels. The categories included writing form (ranging from: 1, drawing only to 12, invented spelling most sounds represented), directionality (ranging from: 1, random placement to 5, conventional linear placement), intentionality (ranging from: 1, Marks/no interpretation/does not interpret marks as a linguistic message, to 5 Intends message/some correspondence), and Task/Message Match (ranging from 1, message unrelated to prompt/task, to 7 labels full sentence(s) related to task context). In the case of their study, the researchers considered these elements separately as they were looking at changes in children's composing over time, however, for the case of this study, scores were considered inclusively using composite scores when appropriate. Like with other coding systems, 20% of the

sample was coded independently by multiple coders, and reliability was maintained in each scoring category Procedural task 1 k form = .94, k directionality = .95, k intentionality = .96, k task-message match = .93; Procedural task 2 k form = .91, k directionality = .96, k intentionality = .91, k task-message match = .83; Narrative task k form = .87, k directionality = .85, k intentionality = .94, k task-message match = .95; Conceptual task k form = .83, k directionality = .82, k intentionality = .94, k task-message match = .92). Information about all of the measures and coding systems is included in Table 2 and more detailed information is provided in Appendix B.1-B.4.

Table 2. Coding Systems

Coding System	Format
Puranik & Lonigan, 2011	Dichotomous scoring based upon presence/absence of seven transcription and conceptual features (linearity, segmentation, simple characters, left-to-right orientation, complex characters, random letters, advanced invented spelling)
Gerde & Bingham, 2013	Summed scores on three polytomous items - oral language output matching task (yes = 2, no = 1, not supplied = 0); written language output matching task (yes = 2, no = 1, not supplied = 0); oral and written outputs matching one another (yes = 2, no = 1, one or more not supplied = 0)
Quinn, Bingham & Gerde, 2016	Dichotomous scoring based upon presence/absence of eleven features of translation, discourse, and register (oral and written relation to task, adherence to task, use of perspective, inclusion of multiple ideas, connection between oral and written outputs on general, form, and task levels)
Rowe & Wilson, 2015	Scaled scores in four subcategories – form (score 0-12; letter formation and spelling), directionality (score 0-4; conventionality of linear writing), intentionality (score 0-5; the degree to which child connects writing to sounds), task-message match (score 0-7; oral message complexity and connection to task)

Data Analysis

All statistical analyses were conducted using SPSS (Statistical Package for the Social Sciences) 22.0 for Windows with a .05 level of confidence. Data was checked for normality, missingness, and outliers. Of these issues, missingness was the only issue that arose. Because of chronic absences and the need to administer assessments over multiple days, several children did not receive every assessment. As such, these children were included in some analyses (i.e., measures of central tendency) but not in analyses that required multiple assessments (i.e., partial correlations, ANOVAs, and regressions. In total, 133 students received the full testing battery.

In order to conduct some of the analyses, composite variables were needed to reduce composing to a single score. All composing scores were summed apart from those from the Rowe and Wilson (2015) method, in which categories have unequal value (e.g. writing form scored out of 12; directionality scored out of 4). Scores in each category were divided by the total possible points in that particular category and subsequently summed.

Results

Nature of Composing in Prekindergarten

In order to address the first research question, concerned with investigating the nature of children's composing development, descriptive statistics were generated to obtain a baseline understanding of general performance on all composing tasks and with each scoring structure. Measures of central tendency for each scoring system are presented in Table 3.

Results reveal that little variability was evident across tasks when using the Puranik and Lonigan (2011) scoring method. Out of a maximum of 7 and a minimum of 0, when using the Puranik and Lonigan (2011) scoring method, children scored between a 4 and a 5 regardless of task context (procedural 1 $M = 4.81$, $SD = 2.44$; procedural 2 $M = 4.38$, $SD = 2.63$; narrative $M =$

4.31, $SD = 2.56$; contextual $M = 4.93$, $SD = 2.25$). As coding was dichotomous based upon the presence or absence of particular traits and behaviors, an average score is less telling than a frequency count as children's writing might exhibit entirely different skills while still getting the same summed score (e.g. one child who writes letters exhibiting invented spelling but they are scattered around the page would score the same as a child who wrote random letters with no attention to sound but in a linear, left-to-right progression, $= 5$). As such, frequency counts were examined. A majority of samples demonstrated the six traits Puranik and Lonigan asserted would develop first across task contexts – linear writing (79%; 73.9%; 75.4%; 80.4%), segmentation of characters (81.9%; 76.8%; 73.2%; 83.5%), simple characters such as dots, circles, and lines or more advanced forms (80.4%; 73.2%; 72.5%; 84.8%), left-to-right orientation (75.4%; 72.5%; 69.6%; 75.9%), complex characters such as letters and letter-like forms (76.1%; 64.5%; 63.8%; 77.2%), and random letters (71%; 58.7%; 61.6%; 73.4%). Invented spelling was far less prevalent than other features (15.9%; 16.7%; 18.1%; 17.7%). Total scores across tasks were significantly correlated (rs $= .23 - .47$, ps $< .01$).

Table 3. Measures of Central Tendency

Composing Scoring Method	M (SD)	Observed Range	Skewness	Kurtosis
Procedural Task 1 (invitation)				
Puranik & Lonigan	4.80 (2.44)	0 – 7	-1.25	-.081
Gerde & Bingham-Comp	4.19 (.98)	1 – 6	.06	.47
GB-Highest Level	2.87 (1.18)	0 – 5	.31	-.17
Quinn, et al	4.00 (2.58)	0 – 11	.89	.30
Rowe & Wilson				
Writing Form	7.22 (3.28)	0 – 12	-.85	-.24
Directionality	3.02 (1.29)	0 – 4	-1.18	-.38
Intentionality	3.72 (.99)	0 – 5	.99	-.34
Task-Message Match	4.63 (2.23)	1 – 7	-.55	-1.39
Procedural Task 2 (list)				
Puranik & Lonigan	4.36 (2.63)	0 – 7	-.80	-1.03
Gerde & Bingham-Comp	4.17 (1.13)	0 – 6	-.78	2.59
GB-Highest Level	2.94 (1.12)	0 – 5	.49	-.31
Quinn, et al	4.76 (3.17)	0 – 11	.53	-.52
Rowe & Wilson				
Writing Form	6.54 (3.61)	0 - 12	-.36	-.97
Directionality	2.66 (1.79)	0 – 4	-.71	-1.39
Intentionality	3.59 (.92)	0 – 5	.32	.32
Task-Message Match	5.35 (2.37)	1 – 7	-.92	.87
Narrative Task (bike)				
Puranik & Lonigan	4.30 (2.65)	0 – 7	-.80	-1.12
Gerde & Bingham-Comp	4.24 (.84)	0 – 6	.60	.99
Highest Level	2.97 (1.01)	1 – 5	.87	-.11
Quinn, et al	5.20 (2.86)	0 – 11	.52	-.35
Rowe & Wilson				
Writing Form	6.46 (3.51)	1 – 12	-.59	.62
Directionality	2.83 (1.74)	0 – 4	-1.24	-.25
Intentionality	3.46 (.79)	3 – 5	.46	.21
Task-Message Match	5.97 (1.96)	1 – 7	-.90	-.85
Contextual Task (raccoon)				
Puranik & Lonigan	4.93 (2.24)	0 – 7	.37	.38
Gerde & Bingham-Comp	3.97 (.88)	0 – 6	-.63	5.97
Highest Level	2.97 (1.01)	0 – 5	.55	.20
Quinn, et al	3.63 (2.54)	0 – 11	1.34	1.23
Rowe & Wilson				
Writing Form	7.44 (2.65)	1 – 12	-.59	.62
Directionality	3.08 (1.55)	0 – 4	-1.24	-.25
Intentionality	3.45 (.91)	1 - 5	.46	.21
Task-Message Match	5.18 (2.44)	0 – 7	-.09	-.85

Considering the Gerde and Bingham (2013) method, composing was scored out of 6 – this score indicates the child provided an oral and a written response that related to the task and that these outputs are connected to one another. Merely providing an oral and written response of any kind guarantees a score of three. On average, across tasks, composing hovered around a score of 4 (procedural 1 $M = 4.19$, $SD = .98$; procedural 2 $M = 4.17$, $SD = 1.13$; narrative $M = 4.24$, $SD = .84$; contextual $M = 3.98$, $SD = .88$). Most commonly, a score of four indicates that the child provided an oral output that related to the task, however, it did not relate to their writing. Another common occurrence was that a child provided oral and written outputs unrelated to the task (e.g. listing letters or a random word); however, as they related to each other, and as such, the child scored a four. In terms of writing stages, children most commonly utilized drawing and scribbling or letter and letter-like shape writing in their composing outputs (combined percentages of sample: 69.8%; 72%; 79.5%; 75.9%). In contrast, echoing the findings in the Puranik and Lonigan (2011), relatively few samples demonstrated either beginning or advanced invented spelling (combined percentages of sample: 20.9%; 23.7%; 19.9%; 21.5%). Across these two scoring components (composing, stage, and complexity) and across tasks, correlational analyses revealed significant relations (rs range .18 - .66; ps < .01) apart from the nonsignificant relation between the composing score of the contextual task and the highest level exhibited of the second procedural task.

The coding method developed by Quinn and colleagues (2016) yielded more variability in terms of average summed score across task context. Out of a possible 11, scores varied considerably dependent upon task context (procedural 1 $M = 4.00$, $SD = 2.58$; procedural 2 $M = 4.76$, $SD = 3.17$; narrative $M = 5.20$, $SD = 2.86$; contextual $M = 3.63$, $SD = 2.54$). As with Puranik and Lonigan (2011)'s coding scheme, items in this case were dichotomously coded and

summed meaning that mean performance does not signal composing characteristics that can be described across children. As items were conceptually grouped in categories (adapted from Gerde & Bingham, 2013) with 4 oral output items, 4 written output items, and 3 items related to the connection between oral and written outputs, further analyses of these means were considered. Across tasks, the most variability was demonstrated in the oral language items (of a possible 4, procedural 1 $M = 1.86$, $SD = 1.24$; procedural 2 $M = 2.52$, $SD = 1.16$; narrative $M = 3.11$, $SD = 1.42$; contextual $M = 2.23$, $SD = 1.30$). Children did not perform as highly or as variably across tasks on the written output items (of a possible 4, procedural 1 $M = .86$, $SD = 1.04$; procedural 2 $M = 1.12$, $SD = 1.35$; narrative $M = 1.04$, $SD = 1.35$; contextual $M = .48$, $SD = 1.04$). There was some marked variability further evidenced in the connection items (of a possible 3, procedural 1 $M = 1.28$, $SD = 1.06$; procedural 2 $M = 1.12$, $SD = 1.05$; narrative $M = 1.06$, $SD = 1.11$; contextual $M = .84$, $SD = 1.12$). While total scores across all item categories were moderately correlated (rs ranging from .28 - .57, ps <.01), when considered among item categories, correlations were inconsistent and many demonstrated non-significant relations across item subgroup and/or across task.

Rowe and Wilson (2015)'s scoring method considered children's writing given four scoring categories with multiple, variable stages within each. Average scores in writing form were between 6 and 8 out of a possible 12 (procedural 1 form $M = 7.21$, $SD = 3.28$; procedural 2 form $M = 6.54$, $SD = 3.61$; narrative form $M = 6.46$, $SD = 3.51$; contextual form $M = 7.43$, $SD = 2.64$). Directionality demonstrated far less variability; across all tasks, the median score (4) was the highest possible stage and means neared this score as well, revealing possible ceiling effects (procedural 1 directionality $M = 3.02$, $SD = 1.59$; procedural 2 directionality $M = 2.66$, $SD = 1.79$; narrative directionality $M = 2.83$, $SD = 1.7$; contextual directionality $M = 3.07$, $SD = 1.54$).

Directionality scored a 0 when drawing was used, and as such the majority of children presented writing either scoring a 0 (18.1%; 28.3%; 25.4%; 15.2%; respectively) or a 4 (69.6%; 60.9%; 65.9%; 70.9%, respectively). Similarly, intentionality scores were somewhat constrained due to the age of participants compared to that of the sample for whom the measure was originally developed. Sixty-five percent of all writing samples across task contexts demonstrated that children understood generally that their writing conveyed meaning however, they did not intentionally identify any component as representative of an oral idea; 8.6% across all contexts attempted to match their oral and written outputs, however without any phonological correspondence; 24.7% made connections between their orally addressed ideas and their written text, and there was some demonstrated orthography or spelling. Task-message match, a measure of children's discourse, register, and task adherence, was variable however largely centered around scores of 5, 6, and 7, corresponding to addressing task demands while using either labeling, phrasing, or full sentences, respectively (cumulatively, these scores accounted for 63%; 64.5%; 85.5%; 67.7%, respectively). Lastly, composite scores of the Rowe and Wilson (2015) scoring system were created in order to conduct subsequent analyses. Scores in each subcategory were divided by the maximum level of that category (e.g. form = 12). Then four scores were summed for a minimum score of 0 and a maximum score of 4 (procedural 1 composite $M = 2.76$, $SD = .92$; procedural 2 composite $M = 2.69$, $SD = .89$; narrative composite $M = 2.79$, $SD = .80$; contextual composite $M = 2.82$, $SD = .79$). Correlational analyses indicated mixed findings, however, measures of writing form, directionality, and intentionality appeared to be related, particularly within task (rs ranging .24 - .84, ps $< .01$) task-message match were largely unrelated to these variables. All correlations across tasks within scoring systems are presented in Table 4.

Table 4. Correlations within Coding Systems

Puranik & Lonigan	1	2	3	4
1. Procedural 1	1			
2. Procedural 2	.42**	1		
3. Narrative	.23**	.38**	1	
4. Contextual	.23**	.27**	.25**	1

Quinn, et al.	1	2	3	4
1. Procedural 1	1			
2. Procedural 2	.57**	1		
3. Narrative	.56**	.47**	1	
4. Contextual	.28**	.46**	.38**	1

Gerde & Bingham	1	2	3	4	5	6	7	8
1. Procedural 1 Composing	1							
2. Procedural 1 Highest Level	.58**	1						
3. Procedural 2 Composing	.56**	.43**	1					
4. Procedural 2 Highest Level	.48**	.65**	.58**	1				
5. Narrative Composing	.44**	.31**	.35**	.36**	1			
6. Narrative Highest Level	.41**	.29**	.32**	.36**	.75**	1		
7. Contextual Composing	.28**	.24**	.18*	.17	.30**	.29**	1	
8. Contextual Highest Level	.45**	.37**	.43**	.46**	.56**	.49**	.43**	1

Rowe & Wilson	1	2	3	4
1. Procedural 1 Composite	1			
2. Procedural 2 Composite	.38**	1		
3. Narrative Composite	.23**	.32**	1	
4. Contextual Composite	.26**	.30**	.38**	1

Note: * indicates $p < .05$, ** indicates $p < .01$

Concurrent Relations between Scoring Systems

To address the second research question, pertaining to the relations between various scoring or coding systems, partial correlations were used, controlling for child age. Across each task, partial correlations were run between children's composing based upon transcription-focused coding (Puranik & Lonigan, 2011), oral and written outputs and their connections, simple form (Gerde & Bingham, 2013) and expanded form (Quinn, et al., 2016), and integrative measure (Rowe & Wilson, 2015) in composite score form. The first procedural task, in which children were asked to write an invitation, yielded strong relations across various scoring systems (rs ranging from .24 - .63, ps < .01). Various scoring procedures of children's composing performance in the second procedural task, in which children were asked to write a shopping list of supplies needed for the party, were consistently correlated (rs ranging from .34 - .58, ps < .01) apart from the relation between the transcription-focused coding (Puranik & Lonigan, 2011) and the expanded oral and written output coding (Quinn, et al., 2016) which was not significant (r = .16, p = .06). This is likely a function of the differing foci of these coding systems: Puranik and Lonigan (2014)'s scoring is based primarily on children's transcription skills in a composing context, whereas Quinn, et al. (2016)'s scoring is based primarily on children's discourse, task adherence, and translation. Consistent with the second procedural task, the narrative task scores were consistently correlated, after controlling for age, (rs ranging from .25 - .71, ps < .01) apart from the relation between the Puranik and Lonigan (2011) and the Quinn, et al. (2016) methods (r = -.023, p = .79) which was non-significant. This pattern, of all composing scoring schemes relating to one another apart from the transcription-focused coding and the oral and written output coding, repeated with the contextual task, in which children are asked to fill in a speech bubble, (rs ranging from .21 - .57, ps < .01). The correlation between Puranik and Lonigan (2011)

scoring and the Quinn, et al. (2016) scoring was not significant ($r = .097$, $p = .23$). Partial correlations are presented in Table 5.

Table 5. Partial Correlations Controlling for Age Among Composing Scores Using Different Coding Systems

Procedural 1	1	2	3	4
1. Gerde & Bingham	1			
2. Puranik & Lonigan	.43**	1		
3. Quinn, et al.	.59**	.24**	1	
4. Rowe & Wilson	.63**	.60**	.49**	1
Procedural 2	1	2	3	4
1. Gerde & Bingham	1			
2. Puranik & Lonigan	.34**	1		
3. Quinn, et al.	.49**	.16	1	
4. Rowe & Wilson	.44**	.55**	.41**	1
Narrative	1	2	3	4
1. Gerde & Bingham	1			
2. Puranik & Lonigan	.28**	1		
3. Quinn, et al.	.62**	-.23	1	
4. Rowe & Wilson	.51**	.25**	.25**	1
Contextual	1	2	3	4
1. Gerde & Bingham	1			
2. Puranik & Lonigan	.22**	1		
3. Quinn, et al.	.54**	.10	1	
4. Rowe & Wilson	.49**	.44**	.57**	1

Note: * indicates $p < .05$, ** indicates $p < .01$
Note: (Gerde & Bingham, 2013) – summed composing score
Note: (Rowe & Wilson, 2015) – composite score across subscales

Issues of Task Dependence

In order to examine whether children's writing varied as a function of the nature of the task, the third research question considered issues of task dependence and composing performance differentiated as a result of the nature of the various composing tasks (i.e. contextual, procedural, and narrative). Thus, repeated measures analyses of variance (ANOVAs) were conducted to examine the effect of task context (IV) on performance (DV) in contextual, procedural, and

narrative conditions. A repeated measures ANOVA is an appropriate choice for this analysis as the samples in this case are dependent (Stevens, 2007). Each scoring system (Puranik & Lonigan, 2011; Gerde & Bingham, 2013; Quinn, et al., 2016; Rowe & Wilson, 2015) was considered separately, and scores from each task were analyzed in a repeated measures ANOVA.

For composing when scored by the Puranik and Lonigan (2011) method, there was a significant effect of task context on performance, Wilks' Lambda = .922, F (3,130) = 3.67, p = .01. Because of the statistical significance detected in the first analysis, paired sample t-tests were used to compare task contexts. Paired t-tests using a Bonferroni adjustment for multiple comparisons yielded mostly nonsignificant differences between tasks contexts, however, two paired t-tests indicated significant difference. Analyses detected a significant difference between children's transcription-focused composing (Puranik & Lonigan, 2011) in the second procedural task (list writing) and the contextual task context, t (132) = -2.77, p = .04. In another paired t-test there was a significant difference between children's composing in the narrative task context and in the contextual task context, t (132) = -2.81, p = .03. As evidenced by these findings, children's contextual composing scores were significantly higher than those from the second procedural task or the narrative task.

Composing scoring based upon the Gerde and Bingham (2013) method was analyzed using repeated measures ANOVA both with the composing score (i.e. the relationship between children's oral and written outputs, and their relation to the task) and with the highest level of writing sophistication used. There was no significant effect of task context on children's performance in composing, Wilks' Lambda = .95, F(3, 130) = 2.23, p = .09 or in highest demonstrated sophistication level, Wilks' Lambda = .95, F(3, 130) = 2.18, p = .09.

For composing when scored by the Quinn, et al., (2016) method, there was a significant effect of task context on performance, Wilks' Lambda = .700, $F(3,130) = 18.59$, $p < .001$. Because of this detected statistical significance, paired sample t-tests were run in order to compare task contexts. Paired t-tests revealed significant differences between the first procedural task (invitation) and the second procedural task (list writing), $t(132) = -3.36$ $p = .01$ and between the first procedural task and the narrative writing task, $t(132) = -5.85$, $p < .001$. Paired t-tests further revealed differences in the second procedural task (list writing) and the contextual writing task, $t(132) = 3.57$, $p = .003$. Lastly, statistically significant differences were detected between children's performance in the narrative task context and the contextual writing task context, $t(132) = 5.39$ $p < .001$. Thus, according to these analyses, children performed significantly lower on the first procedural task and the contextual task than they did the second procedural task or the narrative writing task.

When scoring using the Rowe and Wilson (2015) system, analyses explored task difference in subscales (i.e., writing form, directionality, intentionality, and task-message match) separately as opposed to using composite scores. There were no significant differences detected when considering intentionality across tasks, Wilks' Lambda = .95, $F(3,130) = 2.09$, $p = 27$. While marginal differences were detected in directionality, Wilks' Lambda = .94, $F(3, 130) = 2.73$, $p = .05$, no significant differences arose in pairwise comparisons. Repeated measures ANOVA analyses uncovered statistically significant differences in writing form, Wilks' Lambda = .87, $F(3,130) = 6.48$, $p < .001$. Paired t-tests demonstrated that there were significant differences between the second procedural task (list) and the contextual task, $t(132) = -3.50$ $p = .004$ and between the narrative task and contextual task contexts, $t(132) = -3.61$, $p = .003$. According to

these findings, children used higher levels of writing form in the contextual task context than they did in the narrative context or the second procedural context.

Differences were further detected between task-message match across contexts, Wilks' Lambda = .77, $F(3, 130) = 12.92$, $p < .001$. Individual paired t-tests revealed significant differences between the first procedural task and second procedural task, $t(132) = -3.22$, $p = .01$, between first procedural task and the narrative task, $t(132) = -6.20$, $p < .001$, between the second procedural task and the narrative task, $t(132) = -2.97$, $p = .02$, and between the contextual task and the narrative task, $t(132) = -3.08$, $p = .02$. As evidenced by these findings, when considering task-message match, the narrative task yielded higher scores than the other three task contexts and children scored higher on the second procedural task than they did on the first procedural task. Findings from repeated measures ANOVAs are presented in Table 6.

Table 6. Repeated Measures ANOVAs Across Scoring Systems

Coding	Wilks' Lambda	F(df)	Pairwise Comparisons: t (df)
Puranik	.92	3.67 (3,130)**	
Proc2 vs. Cont.			-2.77(132)*
Narr. vs. Cont.			-2.81(132)*
Gerde -Composing	.95	2.23 (3,130)	
Gerde -Highest Level	.95	2.18 (3,130)	
Quinn	.70	18.59 (3,130)**	
Proc1 vs. Proc2			-3.36 (132)**
Proc1 vs. Narr.			-5.85 (132)**
Proc2 vs. Cont.			3.57 (132)**
Narr. vs. Cont.			5.39 (132)**
Rowe –Form	.87	6.48 (3,130)**	
Proc2 vs. Cont.			-3.50 (132)**
Narr vs. Cont.			-3.61 (132)**
Rowe –Directionality	.94	2.73 (3,130)*	(no significance)
Rowe –Intentionality	.95	2.09 (3,130)	
Rowe –TM Match	.77	12.92 (3,130)**	
Proc1 vs. Proc2			-3.22 (132)**
Proc1 vs. Narr			-6.20 (132)**
Proc2 vs. Narr			-2.97 (132)*
Cont. vs. Narr			-3.08 (132)*

Note: * indicates $p < .05$, ** indicates $p < .01$

Factors and Skills Contributing to Children's Composing

Lastly, to address the fourth research question and to understand the various contributions of other skills and factors to composing, children's transcription skills, emergent literacy, expressive and receptive oral language, and executive function performance were also considered. Measures of central tendency in each assessment are presented in Table 7.

Table 7. Contributing Factors - Measures of Central Tendency

Contributing Factor (measure)	*M (SD)*	Observed Range
Transcription		
Name Writing	5.42 (1.04)	1 – 6
Letter Writing	43.18 (8.70)	10 – 50
Invented Spelling	4.01 (1.38)	0 – 7
Language		
Receptive Syntax (CELF)	8.25 (2.87)	1 - 18
Expressive Vocabulary (CELF)	7.22 (3.28)	1 – 15
Receptive Vocabulary (PPVT)	95.22 (15.13)	75 – 140
Early Reading Skills		
Print Knowledge (TOPEL)	105.22 (14.05)	70 – 133
Phonological Awareness (TOPEL)	90.65 (15.72)	55 - 126
Cognition		
Executive Function (HTKS)	15.48 (17.01)	0 – 57

In order to understand the contributions of these factors to children's composing, partial correlations, again controlling for age, were used in order to determine the relations between composing performance and other skills and processes such as transcription, literacy, language, and EF. As general composing ability was the focus of this particular analyses, children's a scores across tasks within each composing scoring structure were aggregated and entered into correlational analyses with other measures.

Results indicated that transcription abilities were the strongest correlates to performance across aggregated composing scores. Letter writing, a measure of children's handwriting, was significantly correlated to all composing scores (Puranik & Lonigan $r = .25$, $p = .01$; Gerde & Bingham $r = .41$, $p < .001$; Quinn, et al. $r = .40$, $p < .001$; Rowe & Wilson $r = .36$, $p < .001$). Spelling, as measured by children's word writing scores were also significantly correlated across scoring systems (Puranik & Lonigan $r = .27$, $p = .003$; Gerde & Bingham $r = .61$, $p < .001$; Quinn, et al., $r = .64$, $p < .001$; Rowe & Wilson, $r = .57$, $p < .001$). Name writing, an alternative measure of handwriting, although it was not significantly correlated to children's aggregated per-formance using the Puranik and Lonigan (2011) scoring method ($r = .14$, $p = .13$). However,

name writing was significantly correlated to composing scores when other scoring systems were used (Gerde & Bingham $r = .31$, $p = .001$; Quinn, et al., $r = .33$, $p < .001$; Rowe & Wilson, $r = .36$, $p < .001$).

Children's oral language yielded inconsistent correlations with composing: while receptive vocabulary, as measured by the PPVT, was significantly correlated across scoring systems (Puranik & Lonigan $r = .18$, $p = .05$; Gerde & Bingham $r = .22$, $p = .01$; Quinn, et al., $r = .22$, $p = .02$; Rowe & Wilson, $r = .23$, $p = .01$). Expressive vocabulary, as measured by the CELF-P2 expressive vocabulary subtest, was only correlated to the Puranik and Lonigan (2011) method, $r = .20$, $p = .03$, and the Rowe and Wilson (2015) method, $r = .18$, $p = .05$. Children's receptive syntactical knowledge, as measured by the CELF-P2 sentence structure subtest, was not significantly correlated across scoring systems.

The prereading skill of phonological awareness, as measured by the TOPEL phonological awareness subtest, although not significantly associated with the Puranik and Lonigan (2011) composing scores, $r = .11$, $p = .24$., was correlated to composing scores using other scoring methods (Gerde & Bingham, $r = .20$, $p = .03$; Quinn, et al., $r = .27$, $p = .003$; Rowe & Wilson (2015), $r = .26$, $p = .003$). Another key prereading skill, print knowledge, as measured by the TOPEL print knowledge subtest, was correlated to composing scores from the Gerde & Bingham (2013) method, $r = .21$, $p = .02$, and the Rowe and Wilson (2015) method, $r = .19$, $p = .04$. It was not significantly correlated to the other two scoring systems.

Children's executive function, as measured by the Head Toes Knees Shoulders assessment was correlated to composing performance in the Quinn, et al. (2016) scoring context ($r = .20$, $p = .03$), however not when using any of the other scoring systems. The results from the partial correlational analyses are shown in Table 8.

Table 8. Partial Correlations Controlling for Age Between Composing Scores Using Different Scoring Systems and Various Other Measures

Coding	P	G	Q	R
Measure				
Name	.14	.31*	.33**	.36**
Letter	.25**	.41**	.40**	.40**
Spelling	.27**	.61**	.64**	.57**
PPVT	.18*	.22*	.22*	.22*
CELF-EV	.20*	.09	.10	.18*
CELF-SS	.11	.02	-.01	.02
TOPEL-PK	.13	.21*	.16	.19*
TOPEL-PA	.11	.20*	.27**	.26**
HTKS	-.10	.16	.20*	.11

Note: * indicates $p < .05$, ** indicates $p < .01$
Note: P = Puranik & Lonigan (2011); G = Gerde & Bingham [summed composing score] (2013); Q = Quinn, et al. (2016); R = Rowe & Wilson [composite score] 2015

As correlational analyses consider separate relations between particular composing scores and varied other measures, these analyses do not comprehensively address the nature of composing as an integrative, dynamic, and complex system, thus, stepwise multiple regression analyses were used in order to examine the contributions of various early writing, reading, language and EF skills to composing simultaneously. These analyses provide a more stringent analysis as they consider the unique contribution of skills when others are entered (Stevens, 2007). In this case, given the results of the partial correlation analyses, stepwise regressions were used to better understand these relationships.

Four regression analyses were run for each of the coding systems used in the present study to examine the relative contributions to children's composing. As such, children's composing in various coding contexts was entered as the dependent variable (DV) while other factors and characteristics (i.e., age, gender, language, literacy, executive functions) were treated as independent variables (IVs). As existing research demonstrates consistent associations between child age and writing ability (for example, Puranik & Lonigan, 2011; 2014), age was entered in

the first (a priori) step, while those measures that were significant correlates of the particular coding system were entered in the second (exploratory) step. Although the literature provides inconsistent findings regarding the impact of gender on composing (Kamler, 1994; Berninger, et al., 2008; Jensen, 1990), it was also entered (dummy-coded) into the first step. Additional measures of transcription, language, prereading, and executive function were entered in the second step, however, only the variables that were significantly correlated with respective coding system scores in partial correlational analyses were entered to reduce the total number of predictors.

Along with age and gender, letter writing, spelling, and receptive and expressive vocabulary were entered into the stepwise regression analyses to determine whether they could predict children's Puranik and Lonigan (2011) aggregated composing scores. A significant association was found (F (2,127) = 6.18, p = .003), however with a marginal r^2 = .10. Children's predicted composing is equal to 1.43 + .16 (spelling) + .024 (expressive vocabulary), where spelling is measured by average word performance using a phase progression and expressive vocabulary is measured using a polytomous items correctly expressed. Thus, children's composing increases by .16 with each unit increase in spelling average and .024 unit (or partial correct answer) in expressive vocabulary. Age, letter writing, receptive vocabulary, and gender were not significant predictors and were excluded from the final model.

For composing using the Gerde and Bingham method (2013), age was entered in the first step; gender, name writing, letter writing, spelling, receptive vocabulary, print knowledge, and phonological awareness were entered in the second step. A significant effect was found (F (2,129) = 28.32, p < .001) with an R^2 of .39. The final model indicated that children's spelling and receptive vocabulary predicted composing; composing equaled 2.74 +.47 (spelling) + .006

(receptive vocabulary), where receptive vocabulary is measured by dichotomous items correctly identified. Thus, composing increases by .47 with each unit increase in spelling and .006 with each unit (or correctly identified response) in expressive vocabulary. Children's age, gender, name writing, letter writing, print knowledge, and phonological awareness were not significant and were excluded from the final model.

Results for the Quinn, et al. (2016) demonstrated a significant regression (F (2,126) = 16.79, $p < .001$) with an R^2 of .44. The final model indicated that children's spelling and phonological awareness predicted composing. In this case, children's composing equaled -.24 + .36 (spelling) + .02 (phonological awareness), where phonological awareness was measured by dichotomously scored items. Thus, composing increases by .36 with each unit increase in spelling and .02 with each unit (or correct answer) in phonological awareness. As they were not significant predictors, age, gender, name writing, letter writing, receptive vocabulary, and executive function were excluded from the final model.

For the composing scores from the Rowe and Wilson (2015) scoring system, a significant regression was found (F (2,126) = 7.91 $p < .001$) with an R^2 of .34. The final model indicated that children's spelling and phonological awareness predicted composing; composing equaled 1.44 +.24 (spelling) + .02 (phonological awareness), composing increases by .24 with each unit increase in spelling and .02 with each unit (or correct answer) in phonological awareness. Children's age, gender, name writing, letter writing, receptive and expressive vocabulary, and print knowledge, were not significant and were excluded from the final model. Results from all the stepwise multiple linear regression are included in Table 9.

Table 9. Stepwise Multiple Regressions, Final Models

Scoring	Predictors	*b*	*SE*	b	*t*	Significance
Puranik &	Constant	1.43	.34		4.23	<.001
Lonigan	Spelling	.16	.06	.22	2.57	.01
	Exp. Vocab	.02	.01	.19	2.18	.03
Gerde &	Constant	2.74	.31		8.98	<.001
Bingham	Spelling	.47	.05	.60	8.61	<.001
	Rec. Vocab.	.01	<.01	.13	1.93	.05
Quinn, et	Constant	-.24	.21		-1.14	.26
al.	Spelling	.36	.04	.62	9.12	<.001
	PA	.02	.01	.17	2.43	.02
Rowe &	Constant	1.44	.18		8.10	<.001
Wilson	Spelling	.24	.03	.53	7.20	<.001
	PA	.02	.01	.19	2.58	<.001

Note: * indicates $p < .05$; ** indicates $p < .01$.
Note: Based upon average scores across task contexts; Gerde & Bingham (summed composing score), Rowe & Wilson (composite score)

Discussion

The current study examined the nature and measurement of prekindergarten children's early composing skills using a variety of task contexts and scoring systems. Given that previous literature often explored composing either a) in naturalistic, observation studies with limited measurement rigor, or b) with limited information providing a rationale for task and scoring choices, the present study provides critical insights into the construct of composing and how it might most effectively be measured. As such, four major findings, as follows, will be discussed:

1) Great variation in composing performance exists across various tasks and scoring systems, providing meaningful insight into the construct of composing.

2) Differential associations among composing coding systems provide insight into how they assess the construct of composing and what types of writing skills they are tapping into.

3) Task dependence was varied and depended heavily upon coding context.

4) Contributions and constraints to early composing varied across scoring context with spelling, language, and phonological awareness serving as the most robust predictors.

Nature of Composing

In all, children's performance across the tasks varied as a function of the scoring systems. Generally, children's performance across tasks demonstrated reasonably good distribution of scores, however, generally centering around 'average' ranges of various scoring systems, hitting around the median of the various scoring systems (e.g. with the Gerde & Bingham method, children scored on average between 3-5 on a 6-point scale, where scores of 0, 1, 2 were exceedingly rare). This echoes previous research indicating that writing performance among Pre-K children is less advanced than that of children in kindergarten (Molfese, et al., 2011). Within coding methods that considered children's use of conventionally formed letters, linearity, and spelling (e.g. Puranik & Lonigan method; Gerde & Bingham –highest level method; Rowe & Wilson writing form and directionality subscales), results indicated that children were largely writing using letters but on average, not yet fully employing orthographic matching of those letters to sounds. In other words, children's performance, on average, are consistent with other research on the writing skills of children at the end of Pre-K (see Gerde & Bingham, 2013; Puranik & Lonigan, 2011).

Measures that attempted to account more for children's idea generation, task adherence, and discourse (i.e., Quinn, et al. scoring method; Rowe & Wilson task-message match scoring method) indicated that children were matching oral language to task. For example, 61.54% of all products demonstrated oral language that adhered to the demands of the task while 52.45% of all products demonstrated oral language that matched the genre of the task (e.g. perspective taking

for narrative and contextual tasks and/or appropriate procedural language in procedural tasks was evident). Further, mean scores demonstrate children were, on average, adhering to task demands but mostly using labeling or phrases, as opposed to complete sentences (i.e. a score of five or six) in their talk about their writing. However, further inspection demonstrated that the majority of samples hovered around particular scores, with less variability overall. For example, 71% of samples across all task contexts scored a 5, 6, or 7 – relating to task with various levels of discourse, labeling, phrases, complete sentences. In contrast, a small percentage of samples (10.66%) across all task contexts scored a 1 – no relation to task. Meanwhile, only 14.34% of samples, across all task contexts scored a 2, 3, or 4 – a conventional, unrelated message (e.g. 'I love you,' oral language relating to writing materials, functions, or processes, or minimal, global relation to task context, respectively). As the study from which this coding structure originated was conducted with a wider age range of children (i.e., longitudinal analysis from age two to age five), it is likely that these underrepresented categories are more prevalent among younger children. Rowe and Wilson (2015) indicated that these scores (i.e. 2-4) were far less common in pre-K aged children but appeared more often in younger children's writing samples (e.g., scoring 2, conventional, unrelated message: 25% of samples among children aged 3:6-3:11; scoring 3, global relations to materials, processes, or functions: 22% of samples among children aged 2:6-2:11).

A relevant issue arising from the findings explored herein: almost all of the coding systems holistically and by subcategory, were highly constrained by children's ability to write conventional letters and make spelling attempts that are legible to an assessor or a coder. For example, the Puranik and Lonigan coding method depends entirely upon children's ability to write letters, use written language conventions (e.g. left-to-right linearity), and spell. Gerde and Bing-

ham's scoring system for composing (as opposed to complexity or highest writing level), attempts to account for children's understanding of and response to the task, however, in order to score highly, they need to use written language that exhibits sophistication in order to be detected. Similarly, while the Quinn, et al. (2016), method honors alternative types of written communication (e.g. drawings), the highest scores derive from written products that meet the demands of the task and match supplied oral language in terms of content, task, and importantly, conventionality of form. Even the most inclusive method, the Rowe and Wilson (2015) method, removes children's writing from the scoring of the task-message match subcategory (by examining only their oral language and the context of the task itself), but the other subcategories of scoring rely almost entirely on children's writing sophistication (e.g., writing form and directionality are direct measures of children's use of conventions; intentionality requires children to match oral language to written language, without considering the task context). Thus, despite including the task-message match scoring subcomponent and partially alleviating the transcription burden, the Rowe and Wilson (2015) method, counterbalances this with three other scoring categories emphasizing handwriting, spelling, linearity, and children's ability to intentionally translate ideas into written language based upon conventions.

Relations between Scoring Systems

As there are multiple understandings towards how to assess and score children's composing, the second research question addressed the comparisons between these scoring systems. Across various tasks, scoring systems were mostly weakly to moderately associated (rs = .22 to .62, ps < .01), suggesting some convergence in the nature of the way in which measures were assessing the construct. A few notable exceptions to this convergence are scores using the Puranik and Lonigan method and those using the Quinn, et al. method (procedural 2, narrative, and

contextual task contexts, rs = .16, -.23, .10, respectively). As the Quinn, et al. method was de-signed as a counterpart to the Puranik and Lonigan method, this is not unexpected; these two scoring structures emphasize different skills. The Puranik and Lonigan method examines com-posing as represented by children's transcription skills (e.g., letter formation and spelling) in a composing context, whereas the Quinn, et al. method examines composing as demonstrated by children's task adherence, oral and written language connections, and discourse level. Although more unconventional forms of writing scored higher here than they did in other scoring systems, this method is still constrained by children's written sophistication.

The method with the most robust associations to all other tasks appeared to be the Rowe and Wilson method, which was strongly correlated to all other coding systems across all tasks. As the Rowe and Wilson (2015) method is a comprehensive measure incorporating various sub-categories related to composing in different ways, it is ultimately unsurprising that its various subcategories are differentially, strongly associated to other composing scoring systems. Rowe and Wilson (2015) include transcription and conventionality focused subscales (writing form and directionality), a translation focused subscale (intentionality), and discourse and task adherence focused subscale (task-message match). Subcomponents of the Rowe and Wilson (2015) method and other various systems appeared to be measuring similar constructs evidenced by strong asso-ciations – the writing form subscale correlated to Puranik and Lonigan's methods across tasks (r = .66, p < .001). This is expected as both scales focus upon children's ability to use letter for-mation and spelling in composing contexts. This particular subscale was additionally correlated to Gerde and Bingham (2013)'s highest level demonstrated method across tasks (r = .74, r > .001); again, as both measure sophistication in children's writing, these associations are unsur-prising. Further, the intentionality subscale correlated with Gerde and Bingham's translation-

focused composing score ($r = .78$, $p < .001$) and task-message match strongly correlated with Quinn, et al. (2016)'s method, likely as both are focused upon discourse, task adherence, and idea generation ($r = .52$, $p < .001$). In sum, the Rowe and Wilson (2015) method appears to offer various subcomponents that comprehensively incorporate many of the constructs measured by other individual coding systems.

Although the Rowe and Wilson method appears to provide a relatively inclusive measure of early writing as it was created for children ages 2 to 5, its use in this study with children in Pre-K lead to reduced variability within subscales. Potentially, this could be resolved by reworking and adapting the system to remove or reduce developmental phases that children have surpassed by the time they are in pre-K, while simultaneously increasing the variability and adding indicators demonstrated by children more developed in writing than those in Rowe and Wilson (2015)'s original sample. Additional complexity of scoring could be integrated by adding indicators or levels that address such aspects of young children's writing such as written register (e.g. idea generation and knowledge of written language prior to the development of fluent and skilled writing) or genre adherence (e.g. writing a list that is list-like; perspective taking in contextual task), which have been shown to be important elements of early composing (Donovan & Smoklin, 2004; Jensen, 1990; Stellakis & Kondyli, 2004).

Issues of Task Dependence

The third research question examined composing contexts and how they may differentially impact children's performance based upon difficulty, motivations, exposure, or some other cause. Previous research demonstrates that early writing is generally task dependent (Bus, et al., 2001), in that children may demonstrate advanced writing on a conscripted task, e.g. name writing, and may revert to less sophisticated forms when confronted with more open-ended, compos-

ing-focused task contexts. In terms of composing itself, limited work has sought to understand the differentiation in performance based on task performance, however, Gerde and Bingham (2013) demonstrated that children generally provided more advanced forms of writing in a contextual writing task context than an open-ended writing task. Limited other research has sought to understand issues of task dependence across multiple composing tasks (Donovan & Smoklin, 2006; Pellegrini & Galda, 1986), however, the research in this area has a somewhat narrow definition of composing, focusing either on transcription skills (Gerde & Bingham, 2013; Zecker, 1996; 1999) or upon older, conventional writers (Halls-Mills & Apel, 2013).

Results from this study suggest some issues of task dependence, which was heavily dependent upon each coding scheme. In other words, there were no consistent differences across all coding schemes, indicating that the task dependence found is more in-line with the specified scoring structure and perhaps not the task itself. Despite these inconsistencies, some common trends emerged from the data analysis. Generally, in coding schemes that measured children's composing by their ability to form letters and spell words (e.g., Puranik & Lonigan; Rowe & Wilson – writing form method), children performed significantly better on the contextual task when compared to various other task contexts. This demonstrates that children's writing was most complex when in a structured contextual task (e.g., Raccoon bubble writing). However, no differences were detected between task performance using the Gerde and Bingham (2013) highest level exhibited coding. This disparity may stem from less variability in the highest-level coding, when compared to other measures. In other words, this disparity may relate to the fact that the context task scores only range from 1-5 scale, while Rowe and Wilson's writing form uses a 0-12-point scale and the Puranik and Lonigan (2011) method uses 7 dichotomously scored items.

However, on measures that accounted for discourse, task adherence, and oral language (e.g., Quinn, et al.; Rowe & Wilson – task-message match), children generally scored lower in the contextual task than they did other tasks. This type of contextual task generally supports children to perform at a higher level (typically, in terms of transcription), however, it constrains the message and the act of composing, leading to lower scores compared to other, more open-ended tasks. These results may indicate difference in the tasks' nature rather than the relative ease or difficulty of the task.

Of further interest, children's scores were higher in the narrative task when compared to other tasks, to varying degrees. However, this is expected as the narrative measure provides the richest space for oral language and discourse surrounding the task. Further, work illustrates among older children that when task dependence is detected that children often perform best on measures of narrative writing (Hall-Mills & Apel, 2013; Koutsoftas & Gray, 2012). Thus, children may perform best on narrative tasks in terms of oral language and discourse and particularly once transcription and translation skills have been practiced and acquired towards conventional written language; hence, leading to higher performance on narrative writing tasks. Across the discourse-focused coding systems (Quinn, et al.; Rowe & Wilson – task-message match), the first procedural task, the invitation task, demonstrated significantly lower scores. The original source of this task was in studies that looked at parent scaffolding (Skibbe, et al., 2013), thus children in these studies had support, encouragement, and scaffolding that would likely yield stronger performance than when children are confronted with this task along, as they were in the case of the current study. It is possible that the task was too challenging for children to be expected to complete by themselves with little adult support. As children's performance on this task was significantly lower when conceptualized with coding methods focused upon discourse

and task adherence, it is also possible that children may be less familiar with this writing format (invitation) as they are with other task conditions (e.g. narrative writing with picture scaffolds). It is further probable that this assessment, and perhaps others, was not in-line with the classroom and home writing experiences felt by the child.

In sum, task dependence appeared to be largely attributable to differences in scoring structures, however, based upon assessment focus (e.g. transcription or discourse), certain tasks may be more appropriate than others. For example, when examining composing as measured by children's ability to transcribe, a contextual task may be most useful and when examining children's discourse and oral language, a richer task, such as a narrative context, may be more fitting.

Contributing or Constraining Factors to Early Composing

The final research question involved the concurrent relations between composing performance and theoretically related contributors. Results showed variable relations across various scoring systems. While certain skills systems (e.g., various transcription measures, receptive vocabulary) were largely related to all composing scoring, several measures were related to composing systems inconsistently. Subsequent regression analyses yielded further insights into the nature of the contributions from various other tasks while also providing insight into the nature of the composing coding systems themselves.

As indicated by the correlational analyses and further confirmed in the regression analyses, various measures of transcription were highly correlated and predictive of children's composing, regardless of the scoring system used. This is unsurprising given previous research that indicates how critical transcription is to early composing (Hoflundsengen, Hagtvet, & Gustafsson, 2016; Medwell & Wray, 2014) and among older, more skilled writers (Berninger, et al.,

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2006; Limpo, Alves, & Connelly, 2017). Name writing, while not a significant predictor when

entered into regression analyses, was highly correlated to other measures of transcription and

likely did not act as a significant predictor of composing as it suffers from ceiling effects as by

the end of the Pre-K year, many children can write their names with proficiency (Diamond &

Baroody, 2013) as research shows that name writing is the first writing that children acquire

(Welsch, et al., 2003) and it is a demonstrated instructional focus in preschool and prekindergar-

ten classrooms (Bingham, Quinn, & Gerde, 2017). Another measure of handwriting, letter writ-

ing, was significantly correlated but also did not act as a significant predictor towards children's

composing performance. Spelling, however, another critical transcription skill, was a significant

predictor of children's composing across all coding systems. As spelling requires children to not

only employ orthographic knowledge in order to sound out and spell words, it also requires chil-

dren to form letters legibly in order to be detected by assessors and coders. Children's spelling

scores are confounded with handwriting as such, handwriting variables likely lose significance as

spelling performance appropriately encapsulates children's handwriting and spelling simultane-

ously.

Interestingly, language was also a significant predictor across multiple coding systems.

Of particular interest, language appeared to be especially important in predicting translation- and

transcription-focused composing scoring. Receptive vocabulary was particularly important to

the translation-focused scoring system (Gerde & Bingham, 2013), whereas expressive vocabu-

lary was especially important in Puranik and Lonigan's transcription-focused composing scoring.

This is contradictory to previous work wherein definitional vocabulary was not related to genera-

tive tasks (Puranik & Lonigan, 2014). Surprisingly, receptive syntax was not correlated to chil-

dren's composing across all scoring systems, despite the fact that research suggests that syntacti-

cal knowledge is likely important to children translating ideas into the written register, and sub-

sequently, into actual writing (Brandscombe & Taylor, 1996; Horn, 2005; Kim & Schatschnei-

der, 2017). It is possible that the composing task procedures used in the current study did not

encapsulate children's written register as richly as in previous research. On the contrary, poten-

tially it is too early in composing development for these associations to appear.

Phonological awareness was a significant correlate to composing and also an important

predictor to discourse-focused composing scoring (Quinn, et al., 2016) and integrative compos-

ing scoring (Rowe & Wilson, 2015). As both of these methods also rely on conventional writ-

ing, despite their intentions to be inclusive of alternative forms of writing, this is not entirely un-

anticipated. Unexpected, however, is the inconsistent relation of print knowledge to various

composing scoring schemes. This is antithetical to existing research demonstrating the strong

relationship between understanding concepts of print and children's early composing (Daiute &

Morse, 1994; Pinto, et al., 2012; Puranik & Lonigan, 2014). However, as children acquire more

complex skills, for example, spelling, the importance of print knowledge may decrease, as

spelling requires a degree of print knowledge (e.g., letter identification/generation, left-right ori-

entation, linearity, etc.). Thus, it is possible that print knowledge loses significance as it is encap-

sulated by and confounded with other skills.

Executive function was also not a significant predictor and was only correlated to com-

posing when coded using the Quinn, et al. method. As the Quinn, et al. method heavily relies on

idea generation and discourse-level analysis of oral and written language, it may be helped by

higher levels of working memory and executive functions (as measured by the integrative

HTKS; McClelland & Cameron, 2012). However, this measure was not a significant predictor

of composing when scored using the Quinn, et al. method. However, as phonological awareness

was significantly predictive and is highly correlated to EF ($r = .48$, $p < .001$), it is possible that the phonological awareness measure accounted for the contributions of EF above and beyond the EF measure itself as consistent with previous research in children's invented spelling (Zhang, Bingham, & Quinn, under review).

Lastly, despite research that demonstrates their importance, neither age nor gender were significant predictors of children's composing. While gender is theoretically linked to composing based on sociocultural influences, with some studies also linking it empirically to composing (Berninger, et al., 2008; Jensen, 1990; Puranik & Al Otaiba, 2012), in the present study, it did not contribute to children's composing skill. Moreover, despite considerable evidence in existing literature to show that age is important to writing and composing (e.g., Puranik & Lonigan, 2011; 2014; Purcell-Gates, 1994), due to the specific limits in the sample in terms of age (i.e., only Pre-K aged children were assessed), age was not significant in this case.

The current study sought to understand the nature and relations of potential contributions and constraints that may impact children's early composing performance. As was the case with many of the analyses in this study, results were dependent upon each coding scheme of interest, as scoring systems related and were predicted by varied factors differentially. Of critical importance, however, is the significant prediction made by children's spelling consistently across scoring systems. These results indicate that regardless of the ways in which composing is currently conceptualized in the field and regardless of attempts to alleviate the demands of transcription, these skills are salient to overall composing, in both the current study and in the overall literature. Despite attempts to reduce this burden, it appears that transcription and composing are inextricably linked and it is difficult to tease apart this association given measurement-related constraints.

Limitations and Future Directions

A number of limitations should be noted when interpreting the information from this study and considering its implications for practice and future research. First, this study was correlational in nature. Data were collected concurrently in the spring of the school year and, therefore, limit the ability to generalize about writing development. Second, as this study involves a relatively small sample size, partially as a result of unexpected missingness of data, results should be interpreted with caution. Further, the generalizability of the findings is limited based upon the homogeneity of the sample (e.g., majority African American, monolingual, and typically developing children from low-income settings).

Additional limitations constraining the interpretation of results primarily stem from issues of conceptualization and measurement. This study drew largely upon cognitive models of early writing where composing occurs based upon smaller component skills (e.g., handwriting, spelling, oral language, executive function; Kaderavek, et al., 2009; Kim & Schatschneider, 2017; Williams, 2011). In order to address research questions posed by the current inquiry, these component skills were assessed using mostly standardized measures and not holistically. Further, composing was also assessed using traditional testing formats (e.g., to ensure rigor, prompts were minimal and consistent). This understanding of composing and other related skills, while in line with the cognitive models of writing, excludes those theoretical understandings of composing as a sociocultural phenomenon shaped by external environment and experiential and interactive learning (Dennis & Votteler, 2013; Dyson, 1988; Evans, 2012). This study, while approaching composing using a multifaceted and comprehensive assessment plan, is still somewhat limited by its understanding of composing as a cognitive, internal, and solitary process. Future research should attempt to widen the scope of emergent composing assessment, be it in natural-

istic settings (e.g. observational studies in classroom contexts) or with more scaffolded and inter-

active writing tasks.

A further limitation of the current study based upon the measurement choices and scoring

used. While findings yielded mixed associations between composing and other skills, such as

language, literacy, EF and transcription, this may be in part due to the concurrent design of the

study. In order to understand the relations between these skills in composing, it is likely critical

to understand these associations and the development of these skills dynamically and symbioti-

cally across time. Further, in regards to composing, this study serves as an initial step in a fuller

understanding of composing in young children, however, results indicate that composing itself is

impacted heavily by transcription, even when using scoring systems that attempt to alleviate

some of the burden of transcription skills (e.g., Quinn, et al., 2016; Rowe & Wilson, 2015).

While it is certain that transcription skills are necessary to effective, skilled writing and high

quality composition among fluent writers, the beginning stages of composing, which heavily rely

upon language and ideas, should be assessed in ways beyond children's abilities to spell words

and form letters, in order to truly understand how writing develops across the lifespan. Thus,

measures of children's writing that can encapsulate these notions while not drawing upon tran-

scription may be relevant to be used in tandem with measures that assess children's abilities to

use their transcription knowledge in composing contexts. Likely, research into the ways in

which children develop their ability to generate ideas, use of written register, levels of oral and

written discourse, and task adherence across time may be necessary to better understand this

phenomenon. Further, work maintaining rigorous assessment procedures to better understand

the processes children use to compose in early stages may be helpful to elucidating a more com-

prehensive understanding of early composing (e.g., the *how* of writing*, as opposed to just the

what; Oullette & Sénéchal, 2008). An understanding of composing that accounts for children's strategy use and task-variable performance while valuing writing that is not conventional will be key to such investigations. In the current study, children who scored the highest were always those who used conventional transcription. When children's writing is assessed as solely a product, it cannot fully encapsulate the child's thinking and strategy use, meaning that marks and scribbles may appear meaningless to adults but meaningful to the child writers who composed them (Coates, 2002). In other words, "just as spoken language is more than mere pronunciation, writing is more than conventions" (Cusumano, 2008, p. 10). While transcription skills are necessary and critical to writing in general, they heavily constrain the conceptualization of composing in early childhood, reducing it to a demonstration of children's spelling and handwriting skills. Summarily, research directions should point towards a more inclusive understanding of composing in young children and how to measure and assess it. Assessment and measurement should correspond with children's interests, classroom and home experiences, exposure, and motivations and should account or the strategies and processes they enact while engaged with writing instead of viewing the written product as separate from the child. Assessments that account for a variety of different skills, processes, factors, and contextual characteristics will allow for a more dynamic understanding of the development of writing. Further, the development of assessment tools and strategies will create useful tools for researchers and teachers to understanding individual children's composing abilities and pathways towards a more comprehensive understanding of early writing, how it develops, and how it predicts later achievement in writing.

Implications and Conclusion

The current study, despite its limitations, carries implications for early writing and more broadly, emergent literacy research as well as important developments for early childhood teach-

ers and stakeholders. With the recent adoption of the Common Core State Standards (National Governors Association Center for Best Practices, 2010), composing has become an instructional focus in kindergarten; thus, preparing children in Pre-K for these expectations is key.

The goal of this study was to elucidate potential task contexts and scoring procedures that might best encapsulate the nature of early composing to be used for research purposes as well as by teachers in early care classrooms in order to make instructional choices and support and encourage children's writing, specifically composing, development. Research shows that preschool and Pre-K teachers rarely support children's composing, despite the fact that children whose teachers do support composing performed better on various measures of early writing (Bingham, et al., 2017). The overall findings suggest that, as currently conceptualized by multiple assessment systems, composing is variable in prekindergarten, with the nature of this variability dependent upon the ways in which children's writing is scored and assessed. Current existing literature offers limited recommendations as to how teachers might assess composing, instead focusing on assessing children's transcription skills (e.g., Cabell, Tortorelli, & Gerde, 2013). The results of this study indicate that composing is task dependent – consistent with other research, children's writing may be impacted based upon children's interest, motivation, and exposure (Meier, 2013; Nixon & Topping, 2001), and certain tasks yielded lower scores (e.g., invitation) than others, perhaps based upon these constraints. Assessment should strive to measure composing in ways that are meaningful to children. Further, scoring children's writing should likely not solely focus just upon their use of conventional transcription in their written products, but instead, although not a focus of the current study, understand the processes children are using to generate ideas and use writing (conventional or not) to convey those ideas.

A finding that has implications for composing measurement and development is that consistently, regardless of scoring system, composing scores were impacted by transcription skills, and to a lesser extent language. It is critical that we support children's development in these areas in order to support children's composing skills, however, these important findings are affected by measurement and scoring techniques that may not be fully encapsulating the variability of children's early composing and analyses that are correlational in nature. Further research must meet these demands and examine approaches to measurement that are more inclusive of a variety of written products beyond conventional writing. Whereas skilled writing is the ultimate goal for children to achieve, it is developmentally insensitive to expect young children to fully integrate transcription and other skills in order to compose. Thus, the field must shift its understanding of composing to focus more heavily upon meaning making, idea generation, and language factors that likely serve as an important composing foundations while children simultaneously develop in transcription, eventually leading to the seamless amalgamation of these related but distinct skills of transcription, language, and composing.

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APPENDICES

Appendix A. Composing Tasks.

Appendix A.1. Conceptual Writing Task (Gerde & Bingham, 2013)

Appendix A.2. Narrative Writing Task.

Appendix B.1. Transcription-focused Composing (Puranik & Lonigan, 2011)

Feature	Score (1 or 0)
1. **Linearity** (writing units are organized in straight lines, horizontal or vertical [score 1] or scattered across the page [score 0]?)	
2. **Segmentation** (writing contains distinguishable/separate units such as circles, dots, letters, or letter-like characters that are separated, at least 2 units [score 1] or contains fewer than 2 segmented units [score 0]).	
3. **Simple characters** (writing contains simple forms including dots, circles, and short vertical or horizontal lines or more advanced forms [score 1] or includes scribbles or drawings [score 0]).	
4. **Left-to-right orientation** (writing moves from left to right [score 1] or moves right-to-left, vertically, scattered, etc. [score 0]).	
5. **Complex characters** (writing includes letters and/or letter-like forms [score 1] or includes simple units, drawing, or scribbling [score 0]).	
6. **Random letters** (writing includes letters, can be random or phonologically plausible [score 1] or writing includes letter-like forms, simple units, drawing, or scribbles [score 0]).	
7. **Invented spelling** (writing includes letters that represent phonologically plausible spellings of words, more than one sound, e.g. bd = bed [score 1] or writing includes 1 sound, letters that are random, letter-like forms, simple units, drawing, or scribbles [score 0]).	

Appendix B.2. Composing Translation and Highest Level Coding (Gerde & Bingham, 2013)

Verbal response (0 = no response, 1 = response not related to theme, 2 = response related to theme)	
Writing reflects theme (e.g., if write name but say raccoon something) (0 = no response, 1 = response not related to theme, 2 = response related to theme)	
Association between text and verbalization (0= missing one or both responses, 1 = verbal and text not related, 2 = verbal and text yes related)	
Total	
1. Child writes own name as story (0 = no, 1 = yes)	
2. Story is drawing and/or scribbling (0 = no, 1 = yes) (do not code child name)	
3. Story is letters and letter-like forms (0 = no, 1 = yes) (do not code child name)	
4. Story includes beginning and salient sounds (0 = no, 1 = yes) (do not code child name)	
5.Story includes advanced phonological spelling more than beginning and salient sound (0 = no, 1 = yes) (do not code child name)	
Highest Level Score (highest number receiving "yes" score of 1 (1-5)	

Appendix B.3. Expanded Translation-focused Composing (Quinn, et al., 2016)

Item	Score
1. Did child's oral output relate to the task (can be tangentially related) if yes, score 1; if no, score 0	
2. Did child's oral output directly address task demands (i.e. makes sense as a response) if yes, score 1; if no, score 0	
3. Did child's oral output correspond to task's target format/genre/perspective (i.e. letter form for invitation, list form for list, story form for narrative, speaking from mama's perspective for raccoons) if yes, score 1; if no, score 0	
4. Did child's oral output contain multiple ideas (i.e. multiple invitation items, list items, story components, things mama said) if yes, score 1; if no, score 0	
5. Did child's written output relate to task (i.e. writing, without oral output context is tangentially related to task) if yes, score 1; if no, score 0	
6. Did child's written output directly address the task demands (i.e. writing, without oral output context is an appropriate response to the task) if yes, score 1; if no, score 0	
7. Did child's written output correspond to task's target format/genre/perspective (i.e. writing without oral output context, addresses task as seen in #3) if yes, score 1; in no, score 0	
8. Did child's written output contain multiple ideas (i.e. writing without oral output context, contains more than one idea as seen in #4) if yes, score 1; if no, score 0	
9. Did child provide oral and written outputs that were connected to one another (can be tangentially related) if yes, score 1; if no, score 0.	
10. Did child provide oral and written outputs that were related in terms of form (i.e. child orally indicated he wrote letters ABCD and wrote those) if yes, score 1; if no, score 0	
11. Did child provide oral and written outputs that were related in terms of form and task (i.e. child's responses are related and also answer the task) if yes, score 1; if no, score 0.	

Appendix B.4. Integrative Composing (Rowe & Wilson, 2015)

	Writing Form	
Score	Category	Description
0	No marks	Refusal
1	Drawing only	Child draws a picture instead of writing (picture must be identifiable)
2	Uncontrolled motor activity	Marks are unintentional; swipes at paper.
3	Scribbles	Purposefully makes marks' large mass undifferentiated scribbles

Score	Category	Description
4	Scribble units	Small patches of scribbles separated from one another with spaces
5	Individual stroke units	Many repeated lines, circles, or curve strokes (typically of the same type)
6a	Personal manuscript	Letter like forms, combinations of strokes within the same unit.
6b	Personal cursive	Horizontal runs of loops or zigzags
7	Conventional letters plus inventions	Child writes at least one recognizable letter (may be upside down or backwards), remaining marks may be letter like forms or scribbles, etc.
8	Conventional letters (no letter-sound correspondence)	Upper or lowercase letters (reversals acceptable), recognizable as letters but with no connection to intended letter sounds
9	Conventional letters, memorized words	Child uses conventional letters and words but writes something memorized like his name or "I love you"
10	Invented spelling – initial sound	First letter sound of word or syllable represented (phonologically plausible), may contain other random letters
11	Invented spelling – initial and final sound	First and last letter sounds of a word or syllable represented, may contain random letters or leave out other sounds.
12	Invented spelling/Conventional spelling	Most sounds represented, even if incorrect (as long as phonologically plausible spellings)

	Directionality	
Score	Category	Description
0	No writing marks made or a single dot, scribble unit, letters unit, or large scribble OR drawing	If coded as a picture, marks must be clearly identifiable as a recognizable object/person. A dot or other single form is coded here.
1	Random placement of multiple units, letter-like forms, or letters	Child places writing marks without discernable pattern of linearity. This category assumes multiple units are present.
2	Unconventional placement: Linear	Child places writing marks in linear pattern with unconventional directionality (R to L, top to bottom, bottom to top, mixed directionality). Marks may not be conventional letters.
3	Conventional linear placement, 1st line; other lines unconventional	Line 1 marks are placed left to right, after line 1, an unconventional directional pattern is used. Marks may not be conventional letters.
4	Conventional linear placement, all lines	All lines are produced left to right; marks may or may not be conventional letters.

	Intentionality	
Score	Category	Description
0	No marks	Refusal
1	Marks with no interpreta-tion	Child offers writing but refuses to read/provide oral out-put (e.g I can't read, I don't know what it says, gestures to writing but does not say anything, mumble reading)
2	Sign concept	Writes/draws without any idea of what the message might be (e.g. writes and then asks assessor what he/she wrote)
3	Intends message, no con-ventional correspondence	Reads message orally, but no correct letters were used, no evidence of matching speech to writing.
4	Intends message/global speech/pring match; no let-ter-sound correspondence	Reads message orally, points to letters as read (assessor will note which letters correspond to speech sounds), no evidence of letter-sound correspondence
5	Intends message/some let-ter sound correspondence	Reads message orally; At least one letter indicates an attempt at letter sound correspondence

	Task/Message Match	
Score	Category	Description
0	No understandable oral/written message	No message assigned to marks
1	Message unrelated to task	Child reads a message, but it is not related to writing task, materials, process, or functions.
2	Conventional message unrelated to task	Child reads message unrelated to photo or task but con-veying a "standard" or "typical message (e.g. I love you, ABCD, names of family).
3a	Global relation to writing materials	Child reads message that describes characteristics of writing materials in use (e.g. 'it's red' to describe marker)
3b	Global relation to writing functions	Child reads message that describes the social function of writing project, often sounds like oral language di-rected at assessor rather than a written label (e.g. it's for my mom. I'm going to take it home)
3c	Global relation to writing processes	Child reads message that describes processes used in writing, often sounds like oral language directed at as-sessor rather than a written label (e.g. I went around and around).
4	Global relation to task content	Child reads message that is related to the task, often sounds like language directed at assessor rather than a label ('it's about a bike' or 'it's two raccoons')
5	Label/word	Child reads message as a word tht serves as a label for items actions related to task (e.g. "bike" "girl")
6	Label phrase or multiple words	Child reads message as phrase that serves as a label for items or actions related to task (e.g. "riding a bike," or "in the tree")

7	Label sentence	Child reads message as sentence that serves as a label for items or actions related to task (e.g. "She is riding her bike" or "Get down from the tree")