
Gestational Weight Gain Through a Health Literacy Lens: A Scoping Review

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ABSTRACT

Few women gain the recommended amount of weight during pregnancy, which has health implications for mothers and their newborns. Work in this area focuses on factors that are difficult to change. The purpose of this project was to review literature on a more patient-centered concept—health literacy. A scoping review was conducted to determine whether aspects of health literacy are included in gestational weight gain (GWG) research. Thirty articles were selected for review. Although these studies included health literacy aspects indirectly, only 2 directly measured health literacy using existing measures. Work that incorporates health literacy in a GWG context is needed. Health literacy may be a critical, yet understudied, factor in understanding why GWG falls outside of the recommendations.

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INTRODUCTION

Gaining a healthy amount of weight during pregnancy is important for beneficial health outcomes of mothers and their newborns. Inadequate gestational weight gain (GWG) increases the likelihood of low birth weight (Siega-Riz et al., 2009); in contrast, excessive or high GWG is associated with

macrosomia, cesarean birth, perinatal complications, and increases in maternal weight after pregnancy (Fortner, Pekow, Solomon, Markenson, & Chasan-Taber, 2009; Hernandez, 2012; Siega-Riz et al., 2009; Stotland, Cheng, Hopkins, & Caughey, 2006; Stotland, Hopkins, & Caughey, 2004). Unfortunately, few women have GWG that falls into the recommended ranges (see Table 1, which presents the most recent Institute of Medicine [IOM] guidelines for GWG). Various estimates indicate that about one quarter of women gain inadequate amounts and nearly half gain excessive amounts of GWG (Headen, Davis, Mujahid, & Abrams, 2012; Hunt, Alanis, Johnson, Mayorga, & Korte, 2013). Misleading or

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TABLE 1

New Recommendations for Total and Rate of Weight Gain During Pregnancy, by Prepregnancy Body Mass Index

Pregpregnancy Body Mass Index	Total Weight Gain		Rates of Weight Gain ^a Second and Third Trimesters	
	Range (kg)	Range (lb)	<i>M</i> (Range) in kg/week	<i>M</i> (Range) in lb/week
Underweight (<18.5 kg/m ²)	12.5–18.0	28–40	0.51 (0.44–0.58)	1.00 (1.00–1.30)
Normal weight (18.5–24.9 kg/m ²)	11.5–16.0	25–35	0.42 (0.35–0.50)	1.00 (0.80–1.00)
Overweight (25.0–29.9 kg/m ²)	7.0–11.5	15–25	0.28 (0.23–0.33)	0.60 (0.50–0.70)
Obese (≥30.0 kg/m ²)	5–9	11–20	0.22 (0.17–0.27)	0.50 (0.40–0.60)

^aCalculations assume a 0.50–2.00 kg (1.10–4.40 lb) weight gain in the first trimester (based on Siega-Riz, Adair, & Hobel, 1994; Abrams, Carmichael, & Selvin, 1995; Carmichael, Abrams, & Selvin, 1997).

From *Weight Gain During Pregnancy: Reexamining the Guidelines*, by Institute of Medicine, 2009, Washington, DC: The National Academies Press. Copyright 2009 by the National Academies Press. Adapted with permission.

absent health-care provider advice about GWG may partially explain why some women have inadequate or excessive gains (Stotland et al., 2005); however, recent research indicates provider advice may only modestly influence women's actual GWG (Ferrari & Siega-Riz, 2013).

Consider the following hypothetical case study (Part 1): Caitlin, a mom-to-be, told Jane, her childbirth educator, that she was worried about gaining too much weight during this pregnancy and ending up overweight afterward. That happened to Caitlin's own mom who thought she should "eat for two." Although Caitlin's prenatal care provider had given her a goal weight to reach at the end of pregnancy, her friends said they were given lower, and in some cases higher, weight gain goals. Thus, although Caitlin was trying to "eat healthy," she was unsure about her GWG goal, how to manage her weight gain and how it might affect her, the baby, and the birth process, especially since she had been hearing about obesity on the TV.

Although conceptual models have been proposed in an effort to explain psychosocial and contextual determinants of GWG such as those outlined in the case study (Davis, Stange, & Horwitz, 2012; Hill et al., 2013), these have focused on only excessive GWG and mainly on distal or mediating concepts, such as stress, body image, and social support, which may be difficult to alter. Health literacy (Nielsen-Bohlman, Panzer, & Kindig, 2004) is a more proximal and patient-centered concept that has been linked to many health outcomes in adults including

rates of hospitalization, receiving cancer screenings and flu vaccines, use of emergency care, and ability to understand and use prescription medications (Berkman, Sheridan, Donahue, Halpern, & Crotty, 2011). In general, adults with low health literacy have poorer overall health (Berkman et al., 2011; DeWalt, Berkman, Sheridan, Lohr, & Pignone, 2004; HLS-EU Consortium, 2012; Peterson et al., 2011).

Moreover, a systematic review of literature on the impact of parent health literacy on child health outcomes emphasizes that children of parents with low health literacy are at a greater risk for poorer health outcomes than children of parents with adequate health literacy (DeWalt & Hink, 2009). Thus, health literacy may offer an alternative perspective to understanding why many women have lower or higher GWGs than have been recommended in U.S. national guidelines (American College of Obstetricians and Gynecologists, 2013; IOM, 1990, 2009). That is, the inability to find, understand, and/or apply important health information may contribute to inadequate or excessive GWG outcomes.

Although health literacy has been linked to health outcomes, its definition is not without ambiguity. One current definition of health literacy, proposed after reviewing the literature and identifying 13 different definitions of health literacy, is

the degree to which individuals can obtain, process, understand, and communicate about health-related information needed to make informed health decisions. (Berkman, Davis, & McCormack, 2010, p. 16)

One current definition of health literacy is “the degree to which individuals can obtain, process, understand, and communicate about health-related information needed to make informed health decisions.”

This definition points to four distinct sets of skills thought to comprise health literacy, including abilities to obtain, process, understand, and communicate about health-related information. One advantage of this definition is that it adds the important component of communication, which was missing from earlier definitions (Nielsen-Bohlman et al., 2004). In addition, this definition assumes health literacy to be a composite of four sets of skills that apply generally across health topics and contexts, thus comparing them to demographic features such as gender, race, and age. As such, some scholars argue that health literacy is a “general” concept, not to be tied with specific health topics or contexts (Mackert, Champlin, Su, & Guadagno, 2015).

In contrast, other veins of public health and communications research view health literacy as

a concept that is indeed dependent on a specific health topic or context. As a result, health domain-specific conceptualizations of health literacy have been proposed (e.g., diabetes health literacy; Calderón et al., 2014) and (maternal health literacy; Kohan, Ghasemi, & Dodangeh, 2007). One of the contributions of this approach to health literacy is the ability to understand health literacy in the context of a health situation as well as draw attention to health literacy as it relates to a particular health issue (Jorm, 2015). Jorm’s (2000) concept of mental health literacy is one of the most developed articulations of a domain-specific health literacy and includes six aspects thought to comprise mental health literacy, such as knowledge and beliefs about causes and attitudes related to aspects of mental health (see Figure 1). Jorm’s work thus elaborates on the components of health literacy that may be important in managing specific health conditions (Jorm, 2000) rather than looking at health literacy more generally.

In this review exploring health literacy related to GWG, we used concepts from both general health literacy and a domain-specific perspective for

Domain-Specific Health Literacy	
Jorm’s (2000) Definition	Definition Formulated for this Review Adapted From Jorm (2000)
Mental health literacy definition: “knowledge and beliefs about mental disorders which aid their recognition, management, or prevention” (p. 396)	GWG-health literacy: knowledge, beliefs, attitudes, and abilities related to (inadequate, adequate, and excessive) GWG that aid in [making informed decisions about] recognizing, managing, or preventing those that are deviate from expected healthy patterns of GWG
Components of Specific Forms of Mental Health Literacy	Components Formulated for GWG Health Literacy Adapted from Jorm (2000)
“Ability to recognize specific disorders or different types of psychological distress” (p. 396)	Ability to recognize (correctly or incorrectly) inadequate, adequate, or excessive GWG during pregnancy
“Knowledge and beliefs about risk factors and causes [of mental disorders]” (p. 396)	Knowledge and beliefs about risk/contributing factors and consequences of inadequate, adequate, and excessive GWG during pregnancy
“Knowledge and beliefs about self-help interventions [for mental disorders]” (p. 396)	Knowledge and beliefs about self-help interventions for inadequate, adequate, and excessive GWG during pregnancy
“Knowledge and beliefs about professional help available [for mental disorders]” (p. 396)	Knowledge and beliefs about professional help available for inadequate, adequate, and excessive GWG during pregnancy
“Attitudes which facilitate recognition [of mental disorders] and appropriate help-seeking” (p. 396)	Attitudes toward GWG that facilitate recognition of and communication about inadequate, adequate, and excessive GWG during pregnancy and appropriate help seeking for them
“Knowledge of how to seek mental health information” (p. 396)	Knowledge of how to seek and use information about inadequate, adequate, and excessive GWG during pregnancy

Figure 1. Definition and relevant health literacy constructs. GWG = gestational weight gain.

several reasons. First, pregnancy is a life event that is invested with both biomedical as well as everyday health beliefs (e.g., “eating for two”), and we thought capturing the full scope of these beliefs and knowledge was important to understanding GWG from a health literacy perspective. Second, our preliminary literature search for studies using the terminology of “health literacy” related to GWG resulted in locating only three articles; however, when we applied concepts (knowledge, beliefs, and attitudes) drawn from Jorm’s (2000) domain-specific framework for mental health literacy, a number of relevant studies were located. Finally, to our knowledge, these perspectives of health literacy have not previously been integrated, and doing so might provide a meaningful lens from which to view health literacy related to GWG.

Our goal in this scoping review was to examine the range of studies related to GWG from the perspective of health literacy. Our hope was to better understand how women’s health literacy relates to GWG to improve practice and guide future research on this important dimension of care of childbearing women. To this end, we asked the following:

1. How is the “general” definition of health literacy applied to GWG research (women’s capacity to find, understand, make use of, and communicate about GWG)?
2. How is the “health domain–specific” conceptualization of health literacy applied to GWG research (women’s knowledge, beliefs, and attitudes specific to GWG)?

METHODS

This review draws heavily from the methods of scoping reviews set forth by Arksey and O’Malley (2005). Scoping reviews are appropriate for purposes such as delineating the “extent, range, and nature” of studies on a topic, summarizing studies on a topic, or determining what gaps in studies currently exist on a topic (Arksey & O’Malley, 2005, p. 21). Scoping and systematic reviews are similar in using search strategies, having inclusion and exclusion criteria, and systematically extracting data from studies, but they differ in that scoping reviews generally are more fluid, iterative, and comprehensive in focus. Furthermore, because scoping reviews are aimed at creating a panoramic view of a topic of interest, the rating of studies for potential design biases is generally not done (Arksey & O’Malley, 2005).

Search Strategy, Eligibility Criteria, and Study Selection

Given the focus of the present review, a comprehensive literature search was conducted using EBSCOhost Online Research Databases, a platform that searches across nearly 100 databases including Academic Search Complete, CINAHL, Communication & Mass Media Complete, ERIC, Health Source, MedicLatina, MEDLINE, and PsycINFO. Initial searches included the term *gestational weight gain* with each of the following: “health” and “literacy,” “knowledge,” “ability,” “attitudes,” and “beliefs.” These searches presented 362 articles. An additional search was performed outside the EBSCOhost Online Research Databases, which uncovered one additional article found using Google Scholar, for a full initial sample of 363 articles. Exclusion criteria were then applied, narrowing articles to those that focused on our topic of interest (human research reports focused on mothers or mothers-to-be and some aspect of health literacy as it related to GWG) and were published in the past decade (1993–fall 2013). The concept of health literacy first emerged in response to a national assessment of general literacy conducted in 1993, which shed light on large deficits in literacy specifically related to health (Ad Hoc Committee on Health Literacy, 1999). As such, we selected 1993 as a starting point for our scoping review as the term *health literacy* was just emerging at that time. Because we wanted to examine the full scope of relevant studies related to GWG health literacy, we included those that were qualitative, quantitative, or mixed-methods studies (see Figure 2 for the process of study selection resulting in a final sample of 30 articles).

Data Extraction, Organization, and Summarization

After generating a sample of articles related to our research interests, we then constructed a coding guide of items that would capture elements of GWG health literacy (see Table 2 for examples of coding items). Of particular interest were the components of “general” health literacy—patient capacity for finding, understanding, using, and communicating about GWG information. The presence of each of these components was coded separately. The sample of articles was also coded for whether or not health literacy was directly assessed in the study.

In addition to the components of general health literacy, we also included codes based on Jorm’s

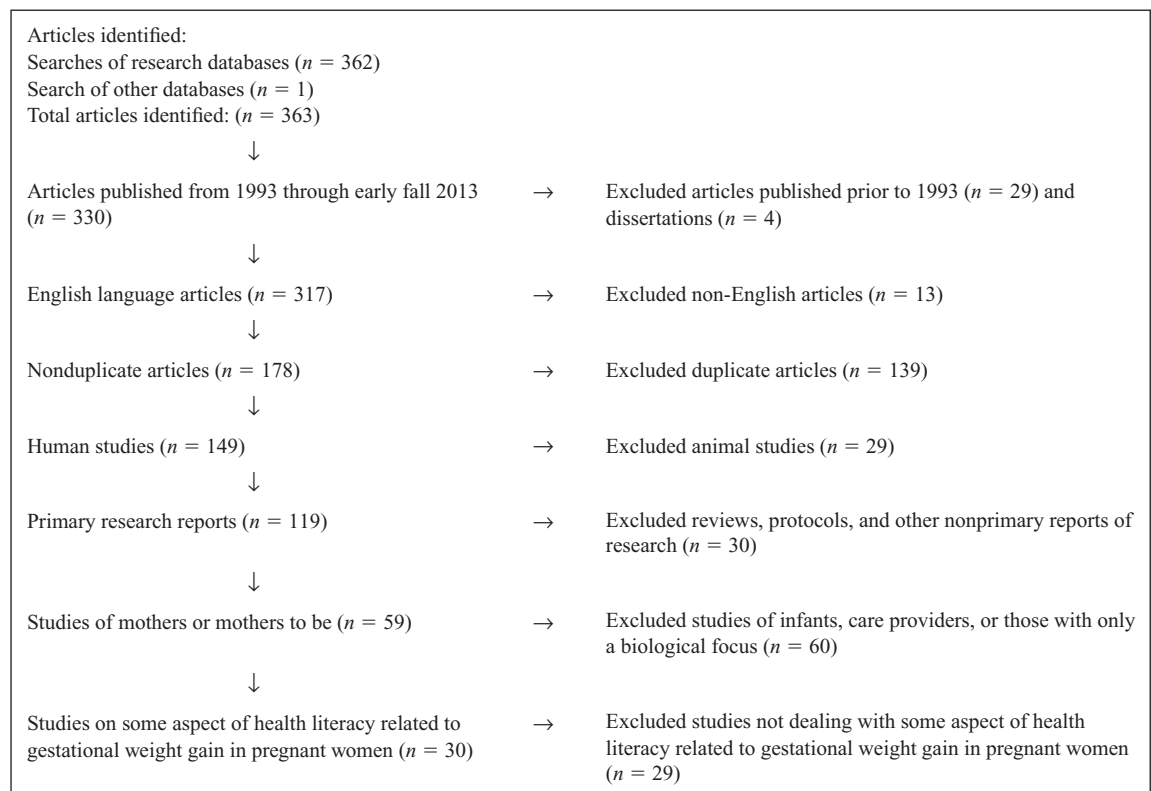


Figure 2. Flow table of articles exclusions.

(2000) health domain-specific view of mental health literacy, which suggests that attitudes and beliefs and knowledge about a health concept contribute to health literacy. As such, we adapted Jorm's points for mental health literacy to a GWG context, which included attitudes that facilitate help seeking and beliefs and knowledge including one's ability to recognize recommended GWG, the risk factors and causes of GWG, self-help intervention strategies, and beliefs and knowledge about receiving professional help and how to seek information about GWG. In addition, there exists a standardized measure to capture women's attitudes toward GWG (Palmer, Jennings, & Massey, 1985) and whether or not researchers used this measure was included as a code in our guide. All items (both general and domain-specific) were coded as either not present in the study at all, a "peripheral" focus of the study (meaning that the study may have addressed the topic briefly or included a few related items in a survey), or a "core" focus of the study (the main purpose of the study).

In addition to these health literacy items, it was also important to outline the context of each study including the number of participants, the data

collection and presentation strategies used, where the study took place, the racial/ethnic, and socioeconomic status breakdowns of the sample. If this information was not available in the manuscript, the item was coded as "insufficient."

RESULTS

Characteristics of Studies and Samples

A sample of 30 articles met the inclusion criteria for the present review (Copper, DuBard, Goldenberg, & Oweis, 1995; de Jersey, Nicholson, Callaway, & Daniels, 2012; Dipietro et al., 2003; Everette, 2008; Ferrari & Siega-Riz, 2013; Ferraro et al., 2011; Gaudet, Gruslin, & Magee, 2011; Groth & Kearney, 2009; Groth, Morrison-Beedy, & Meng, 2012; Gutierrez, 1999; Haakstad et al., 2009; Haruna et al., 2010; Herring, Henry, Klotz, Foster, & Whitaker, 2012; Kohan et al., 2007; Lee et al., 2012; Mehta, Siega-Riz, & Herring, 2011; Mumford, Siega-Riz, Herring, & Evenson, 2008; Olander et al., 2011; Paul et al., 2013; Phelan et al., 2011; Shieh & Weaver, 2011; Shub et al., 2013; Stengel, Kraschnewski, Hwang, Kjerulff, & Chuang, 2012; Stevens-Simon, Nakashima, & Andrews, 1993; Stotland et al., 2005; Sui, Turnbull, & Dodd, 2013; Swann et al., 2009; Tovar et al., 2011;

TABLE 2
Examples of Coding Items

		Example
General health literacy	Finding	(Core) "Our goal was to determine the information channels used by pregnant women to obtain information on nutrition and exercise" (Ferraro, Rutherford, Keely, Dubois, & Adamo, 2011, p. 59).
	Understanding	(Core) "The women in this convenience sample were asked to identify their weight category, their understanding of the complications of obesity and excessive GWG in pregnancy and safe and/or effective weight management strategies in pregnancy" (Shub, Huning, Campbell, & McCarthy, 2013, p. 278).
	Making use of	(Core) "Women who attended the workshop increased their consumption of serves of fruit, vegetables, met fruit guidelines, had a higher diet quality score, and clinically relevant increases in physical activity . . ." (Wilkinson & McIntyre, 2012, p. 131).
	Communicating about	(Peripheral) "They said you can eat cabbage. I don't eat cabbage, but I eat collard greens. So I told my grandma to make me some cabbage" (Paul, Graham, & Olson, 2013, p. 347).
GWG attitudes	Attitudes that facilitate recognition and help seeking	(Peripheral) Survey items included "Weight Gain Restrictive Behaviors: If I gain too much weight one month, I try to keep from gaining the next month. I tried to keep my weight down so I didn't look pregnant earlier on" (Dipietro, Millet, Costigan, Gurewitsch, & Caulfield, 2003, p. 1316).
GWG beliefs/knowledge	Ability to recognize	(Core) "When asked how much weight a woman should gain during pregnancy, nearly half of the participants gave a number or range within the IOM recommendations for weight gain of normal-BMI women" (Groth & Kearney, 2009, p. 455).
	Risk factors/causes	(Peripheral) "Frequently, the nutrition knowledge was based on miseducation, misconceptions, and/or 'a grain of truth' i.e. folk beliefs" (Everette, 2008, p. 718).
	Self-help intervention	(Peripheral) "A number of women also believed that performing regular exercise would improve the feeling of well-being, be important in reducing pregnancy complaints and be a factor to prevent excessive weight gain in pregnancy" (Haakstad, Voldner, Henriksen, & Bø, 2009, p. 1270).
	Professional help	(Peripheral) "Some increased regular physical activity and some said that the encouragement and support provided by dieticians helped them to manage their weight during pregnancy" (Lee, Karpavicius, Gasparini, & Forster, 2012, p. 430).
	How to seek information	(Peripheral) "Because of lack of information from health professions, 'the pregnant women reported relying on the internet to tell them what they needed to know [about weight gain]" (Olander, Atkinson, Edmunds, & French, 2011, p. 45).

Note. GWG = gestational weight gain; IOM = Institute of Medicine; BMI = body mass index.

Wilkinson & McIntyre, 2012; Wilkinson, Walker, & Tolcher, 2013). Characteristics of these studies are included in Table 3. Most of the studies included in these articles were descriptive in nature; only three studies focused on designing, piloting, or evaluating an intervention (Lee et al., 2012; Wilkinson & McIntyre, 2012; Wilkinson et al., 2013). Across our sample, studies employed various data collection methods, and some used multiple data collection strategies including paper-and-pencil, electronic, or phone surveys ($n = 23$), focus groups ($n = 5$), anthropomorphic/metric measurements ($n = 6$), reviews of medical records ($n = 6$), interviews ($n = 6$), observations ($n = 1$), and diet recall ($n = 1$; see Table 3).

Nineteen of the studies included only quantitative results and seven included only qualitative results. In addition to these, four studies presented both qualitative and quantitative results (mixed-methods studies). Of the 30 studies included, 16 were considered longitudinal designs. A majority of the studies were conducted in the United States ($n = 17$); however, several were conducted in other countries such as Australia ($n = 6$), Canada ($n = 2$), Norway ($n = 2$), Japan ($n = 1$), England ($n = 1$), and Iran ($n = 1$). Study sample sizes ranged from 9 (a small scale study that used focus groups) to 35,929 (a large scale study that was able to access birth registries from an entire country; see Table 3).

TABLE 3
Study and Sample Characteristics

Study	Study Characteristics					Sample Characteristics					
	Sample Size	Method of Data Collection	Results	Longitudinal	Location of Study	Average Age or Age Range	% White	% Hispanic	% Black	% Asian	% Other
Copper et al. (1995)	1,000	Survey, anthro, EHRs	Quant.	Yes	United States	Insuff. ^a	31.0	0.0	69.0	0.0	0.0
de Jersey et al. (2012)	664	Survey, anthro	Quant.	Yes	Australia	29.9	Insuff.	Insuff.	Insuff.	Insuff.	Insuff.
Dipietro et al. (2003)	130	Survey	Quant.	No	United States	31.3	86.0	0.0	12.0	0.0	2.0
Everette (2008)	119	Interview	Qual.	No	United States	16.0–22.0	0.0	0.0	100.0	0.0	0.0
Ferrari and Siega-Riz (2013)	1,454	Survey, interview	Quant.	No	United States	<18.0–35.0+	72.2	0.0	18.8	0.0	9.1
Ferraro et al. (2011)	147	Survey	Quant.	No	Canada	30.9	78.5	0.0	0.0	0.0	21.5
Gaudet et al. (2011)	117	Survey	Quant.	No	Canada	<20.0–40.0+	72.6	0.0	1.0	21.4	1.7
Groth and Kearney (2009)	49	Interview	Both	No	United States	24.9	24.5	26.5	49.0	0	0
Groth et al. (2012)	26	Survey and focus group	Qual.	No	United States	18.0–39.0	0.0	0.0	92.0	0	8.0
Gutierrez (1999)	46	Survey, 24-hour diet recall	Both	Yes	United States	13.0–18.0	0.0	100.0	0.0	0.0	0.0
Haakstad et al. (2009)	467	Survey	Quant.	No	Norway	31.6	100.0	0.0	0.0	0.0	0.0
Haruna et al. (2010)	9	Focus group	Qual.	No	Japan	33.0	0.0	0.0	0.0	100.0	0.0
Herring et al. (2012)	31	Focus group	Qual.	No	United States	24.0	0.0	0.0	100.0	0.0	0.0
Kohan et al. (2007)	150	Survey, observation	Quant.	Yes	Iran	20.0–28.0	Insuff.	Insuff.	Insuff.	Insuff.	Insuff.
Lee et al. (2012)	74	Survey, records	Both	Yes	Australia	32.0	Insuff.	Insuff.	Insuff.	Insuff.	Insuff.
Mehta et al. (2011)	1,192	Survey, records	Quant.	Yes	United States	29.1	72.5	0.0	19.3	0.0	0.0
Mumford et al. (2008)	1,223	Survey, records, anthro	Quant.	Yes	United States	<20.0–30.0+	73.0	0.0	19.0	0.0	8.0
Olander et al. (2011)	23	Focus group	Qual.	No	England	18.0–55.0	Insuff.	Insuff.	Insuff.	Insuff.	Insuff.
Paul et al. (2013)	26	Focus group	Qual.	No	United States	18.0–35.0	57.7	11.5	42.3	3.8	0.0
Phelan et al. (2011)	401	Survey, anthro, interview	Quant.	No	United States	28.7	65.3	19.0	8.5	0.0	7.2
Shieh and Weaver (2011)	113	Survey	Quant.	No	United States	25.4, 27.3	27.4	0.0	72.6	0.0	0.0
Shub et al. (2013)	364	Survey, anthro	Quant.	No	Australia	28.0–35.0	Insuff.	Insuff.	Insuff.	Insuff.	Insuff.
Stengel et al. (2012)	24	Interview, records	Qual.	Yes	United States	21.0–35.0	96.0	0.0	0.0	0.0	4.0
Stevens-Simon et al. (1993)	99	Survey, anthro	Quant.	No	United States	16.3	58.0	15.0	25.0	0.0	2.0
Stotland et al. (2005)	1,198	Survey	Quant.	Yes	United States	18.0–45.0	37.7	29.1	16.6	16.6	0.0
Sui et al. (2013)	490	Survey, interview	Both	Sequential	Australia	<20.0–40.0+	91.5	0.0	0.7	4.6	3.2
Swann et al. (2009)	35,929	Survey, records	Quant.	Yes	Norway	29.9	Insuff.	Insuff.	Insuff.	Insuff.	Insuff.
Tovar et al. (2011)	249	Survey, records	Quant.	Yes	United States	25.0–35.0	65.1	0.0	0.0	0.0	34.9
Wilkinson and McIntyre (2012)	360	Survey	Quant.	Yes	Australia	29.5, 29.0	Insuff.	Insuff.	Insuff.	Insuff.	Insuff.
Wilkinson et al. (2013)	899	Survey	Quant.	Yes	Australia	29.8, 28.6 (no 2008 data)	Insuff.	Insuff.	Insuff.	Insuff.	Insuff.

Note. Anthro = anthropology; EHRs = electronic health records; Quant. = quantitative data collection; Insuff. = insufficient; Qual. = qualitative data collection.

^aArticle did not include enough information to determine code.

Participants were typically from a variety of socioeconomic backgrounds ($n = 16$); however, in only three studies were the participants drawn from socioeconomically disadvantaged backgrounds (Groth et al., 2012; Gutierrez, 1999; Herring et al., 2012). Many of the studies ($n = 10$) did not include a report of participants' socioeconomic status, a variable that could play a vital role in understanding factors that impact GWG. Similarly, a substantial number of studies did not include a distribution of participant race/ethnicity ($n = 7$). Of those that did report this information, most included a majority White sample ($n = 13$; see Table 3).

General Approach to Health Literacy

Only 2 of the 30 studies directly assessed general health literacy (Kohan et al., 2007; Shieh & Weaver,

2011), and only 1 of those 2 studies (Shieh & Weaver, 2011) employed a commonly used measure (the Short Test of Functional Literacy in Adults). It is important to note that the other study to directly assess health literacy did not have sufficient information and could not be coded for any of the health literacy component variables (i.e., the study did not include this methodological information in the article). Similarly, 10 of the sample studies did not focus on *any* element of general health literacy (finding, understanding, using, and communicating about GWG information; Table 4). Of the studies that included a focus on finding GWG information ($n = 10$), only one study had this as its core focus. Similarly, 10 of the articles included in our sample focused on pregnant women's understanding of GWG information, with only 2 articles with a core focus on this health

TABLE 4
Presence of General Health Literacy Components Related to Gestational Weight Gain

Study	General Health Literacy			
	Finding	Understanding	Making Use Of	Communicating About
Copper et al. (1995)	No	No	No	No
de Jersey et al. (2012)	No	Peripheral	No	No
Dipietro et al. (2003)	No	No	No	No
Everette (2008)	No	No	No	No
Ferrari and Siega-Riz (2013)	No	No	Peripheral	No
Ferraro et al. (2011)	Core	No	Peripheral	Peripheral
Gaudet et al. (2011)	Peripheral	Peripheral	No	No
Groth and Kearney (2009)	No	No	No	No
Groth et al. (2012)	Peripheral	No	Peripheral	Peripheral
Gutierrez (1999)	No	No	No	No
Haakstad et al. (2009)	No	No	Peripheral	No
Haruna et al. (2010)	Peripheral	No	No	No
Herring et al. (2012)	Peripheral	No	No	No
Kohan et al. (2007)	Insufficient ^a	Insufficient	Insufficient	Insufficient
Lee et al. (2012)	No	Peripheral	Peripheral	No
Mehta et al. (2011)	No	No	No	No
Mumford et al. (2008)	No	No	No	No
Olander et al. (2011)	Peripheral	No	No	No
Paul et al. (2013)	Peripheral	No	Peripheral	Peripheral
Phelan et al. (2011)	No	Peripheral	No	No
Shieh and Weaver (2011)	Peripheral	Peripheral	Peripheral	No
Shub et al. (2013)	No	Core	No	No
Stengel et al. (2012)	Peripheral	No	No	Peripheral
Stevens-Simon et al. (1993)	No	No	No	No
Stotland et al. (2005)	No	Peripheral	No	No
Sui et al. (2013)	No	No	No	No
Swann et al. (2009)	No	No	No	No
Tovar et al. (2011)	No	Peripheral	Peripheral	No
Wilkinson and McIntyre (2012)	No	Core	Core	No
Wilkinson et al. (2013)	Peripheral	Peripheral	No	No

^aArticle did not include enough information to determine code.

literacy element. Only nine of the articles focused on women's use of GWG information (with only one article with this as the core focus) and four focused on how women communicate about GWG information (this element was not the core focus of any study).

Health Domain–Specific Approach to Health Literacy

Seventeen of the articles in the sample focused on attitudes that facilitate recognition and help seeking for GWG (Table 5). Of these articles, this concept was the core focus of six articles. Most of these articles (12 of the 17) measured attitudes using a survey that was either paper-and-pencil, electronic, or orally administered, whereas the remaining studies assessed attitudes through focus groups ($n = 3$) or interviews ($n = 2$; women discussed their attitudes toward

GWG). Of the articles that focused on attitudes, eight included Palmer et al.'s (1985) validated scale of attitudes about weight gain during pregnancy. Similarly, many of the articles ($n = 7$) exhibited a peripheral focus on the concept of attitudes toward GWG that facilitate recognition and help seeking; yet, none of these articles made this a core focus.

Another domain-specific concept adapted from Jorm (2000) included beliefs and knowledge about GWG. This topic was the focus of 22 of the articles included in our review, and 12 of these articles made beliefs and knowledge about GWG a core focus of the study (Table 6). Two articles had insufficient information available to code many of the items included in this category. Eighteen articles assessed beliefs and knowledge through surveys or interviews; the remaining studies assessed this concept using a focus group strategy. Fifteen of the articles that made this

TABLE 5
Domain Specific Health Literacy: Gestational Weight Gain Attitudes in Study Based on Adaptation of Jorm's (2000) Framework

Study	Focus	How Measured	Palmer Used	Attitudes		
				Measure Created for Study	Previously Validated Measure	Attitudes That Facilitate Recognition and Help Seeking
Copper et al. (1995)	Core	Survey	Yes	No	No	No
de Jersey et al. (2012)	No	No	No	No	No	No
Dipietro et al. (2003)	Core	Survey	Yes	No	No	Peripheral
Everette (2008)	No	No	No	No	No	No
Ferrari and Siega-Riz (2013)	Peripheral	Survey	Yes	No	No	No
Ferraro et al. (2011)	Peripheral	Survey	No	Yes	No	Peripheral
Gaudet et al. (2011)	No	No	No	No	No	No
Groth and Kearney (2009)	Peripheral	Interview	No	Yes	No	Peripheral
Groth et al. (2012)	Peripheral	Focus group	No	No	No	Peripheral
Gutierrez (1999)	Core	Survey	Yes	No	No	No
Haakstad et al. (2009)	No	No	No	No	No	No
Haruna et al. (2010)	Peripheral	Focus group	No	No	No	No
Herring et al. (2012)	No	No	No	No	No	No
Kohan et al. (2007)	No	No	No	No	No	No
Lee et al. (2012)	Peripheral	Survey	No	No	No	No
Mehta et al. (2011)	Peripheral	Survey	Yes	No	No	No
Mumford et al. (2008)	Peripheral	Survey	Yes	No	No	No
Olander et al. (2011)	Peripheral	Focus group	No	No	No	Peripheral
Paul et al. (2013)	No	No	No	No	No	No
Phelan et al. (2011)	No	No	No	No	No	No
Shieh and Weaver (2011)	Core	Survey	No	No	Yes	Peripheral
Shub et al. (2013)	No	No	No	No	No	No
Stengel et al. (2012)	Peripheral	Interview	No	No	No	Peripheral
Stevens-Simon et al. (1993)	Core	Survey	Yes	No	No	No
Stotland et al. (2005)	No	No	No	No	No	No
Sui et al. (2013)	No	No	No	No	No	No
Swann et al. (2009)	Core	Survey	No	Yes	No	No
Tovar et al. (2011)	Peripheral	Survey	Yes	No	No	No
Wilkinson and McIntyre (2012)	No	No	No	No	No	No
Wilkinson et al. (2013)	No	No	No	No	No	No

TABLE 6

Domain Specific Health Literacy: Gestational Weight Gain Beliefs/Knowledge in Study Based on Adaptation of Jorm's (2000) Framework

Study	Focus	How Measured	Beliefs/Knowledge						
			Measure Created for Study	Previously Validated Measure	Ability to Recognize	Risk Factors/ Causes	Self-Help Intervention	Professional Help	How to Seek Information
Copper et al. (1995)	No	No	No	No	No	No	No	No	No
de Jersey et al. (2012)	Insufficient ^a	Survey	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient
Dipietro et al. (2003)	No	No	No	No	No	No	Peripheral	No	No
Everette (2008)	Core	Interview	No	No	Peripheral	Peripheral	No	No	No
Ferrari and Siega-Riz (2013)	No	No	No	No	No	No	No	No	No
Ferraro et al. (2011)	Peripheral	Survey	Yes	No	No	Peripheral	Peripheral	No	No
Gaudet et al. (2011)	Peripheral	Survey	Yes	No	Peripheral	No	No	Peripheral	Peripheral
Groth and Kearney (2009)	Core	Interview	Yes	No	Core	Peripheral	No	No	No
Groth et al. (2012)	Core	Focus group	No	No	Peripheral	Peripheral	No	Peripheral	Peripheral
Gutierrez (1999)	Peripheral	Survey	Yes	No	No	Peripheral	No	No	No
Haakstad et al. (2009)	Peripheral	Survey	Yes	No	No	Peripheral	Peripheral	No	No
Haruna et al. (2010)	Core	Focus group	No	No	Peripheral	Peripheral	No	Peripheral	Peripheral
Herring et al. (2012)	Core	Focus group	No	No	Peripheral	Peripheral	No	Peripheral	Peripheral
Kohan et al. (2007)	Core	Survey	Insuff.	Insuff.	Insuff.	Insuff.	Insuff.	Insuff.	Insuff.
Lee et al. (2012)	Peripheral	Survey	Yes	No	No	Peripheral	No	Peripheral	No
Mehta et al. (2011)	No	No	No	No	No	No	No	No	No
Mumford et al. (2008)	No	No	No	No	No	No	No	No	No
Olander et al. (2011)	Core	Focus group	No	No	Peripheral	No	No	No	Peripheral
Paul et al. (2013)	Peripheral	Focus group	No	No	Peripheral	Peripheral	Peripheral	No	No
Phelan et al. (2011)	Core	Survey	No	Yes	No	No	No	No	No
Shieh and Weaver (2011)	Peripheral	Survey	No	Yes	No	No	No	No	Peripheral
Shub et al. (2013)	Core	Survey	Yes	No	Peripheral	Peripheral	Peripheral	No	No
Stengel et al. (2012)	Peripheral	Interview	Yes	No	Peripheral	Peripheral	No	Core	Core
Stevens-Simon et al. (1993)	No	No	No	No	No	No	No	No	No
Stotland et al. (2005)	Core	Survey	Yes	No	Core	No	No	No	No
Sui et al. (2013)	Core	Survey and interview	Yes	No	Peripheral	Peripheral	Peripheral	No	No
Swann et al. (2009)	No	No	No	No	No	No	No	No	No
Tovar et al. (2011)	Peripheral	Survey	No	No	Peripheral	Peripheral	No	No	No
Wilkinson and McIntyre (2012)	Peripheral	Survey	No	Yes	Core	Insufficient	Peripheral	No	No
Wilkinson et al. (2013)	Core	Survey	Yes	No	Peripheral	Insufficient	No	Peripheral	Peripheral

^aArticle did not include enough information to determine code.

topic a focus of their study included emphasis on the beliefs and knowledge women have about how to recognize inadequate or excessive GWG (three of these studies made this concept a core focus of the study). Fourteen included a peripheral focus on examining women's beliefs and knowledge about the risk factors and causes of GWG (although none of the studies made this a core focus). About one third (31.8%) of the articles focused on self-help interventions and beliefs and knowledge about professional help on the topic of GWG. Finally, only eight of the articles included any focus on women's beliefs and knowledge about how to seek information on this important health topic.

DISCUSSION

Previous research suggests that low health literacy is associated with negative health outcomes (Berkman et al., 2011; DeWalt et al., 2004; DeWalt & Hink, 2009; HLS-EU Consortium, 2012; Peterson et al., 2011); as such, it was expected that the application of this concept would be found in GWG research. However, this scoping review uncovers an important issue: Health literacy is rarely applied to explain GWG outcomes. In our large scoping review, only two articles measured general health literacy directly in a GWG research context. Indeed, health literacy was not mentioned in an extensive report to the Agency for Healthcare Research and Quality on research related to GWG (McKoy, Hartmann, Jerome, Andrews, & Penson, 2010). Given both the prevalence of GWG outside of the recommendations and the relationship patient health literacy has with overall health outcomes, it is necessary and critical that health literacy be applied to better understand GWG outcomes.

In this study, we incorporated two views of health literacy to capture the greatest number of instances of health literacy paired with GWG research. Under the "general" approach to health literacy, this concept is broadly defined as an individual's capacity to find, understand, make use of, and communicate about health information in an effort to make informed health decisions (Berkman et al., 2010). Findings from this scoping review suggest that previous work done to understand how pregnant women interact with health information has focused on these components of health literacy separately, with several studies looking at either finding, understanding, using, or communicating about health information as specific concepts.

Efforts to improve all of these health literacy skill sets are needed to ensure that women receive, understand, and can use necessary information about GWG. A broad focus on improving general health literacy may equip patients with a collection of skills necessary for interacting with GWG information rather than choosing only some of these skills and intervening only in those areas (e.g., helping women only understand GWG rather than also including how they can find and use this information). Given previous research on the impact of health literacy on health, it may be that weight gained during pregnancy can also be explained, at least partially, by a patient's health literacy. We feel that a focus on patient health literacy in a GWG context can be most helpful for these patients and could save health-care providers' time and resources.

In the present review, we also included a domain-specific approach to health literacy by using Jorm's (2000) framework for understanding mental health literacy, which brought the concepts of attitude, beliefs, and knowledge of GWG. Jorm's concepts were more often the focus of the reviewed studies rather than the components of general health literacy as outlined earlier. A question that stems from work in this area is whether a patient's health literacy skills should be thought to generalize to all health outcomes or if these skills are context-specific (in this case, does the GWG context require specific health literacy skills?). More work is needed to understand whether GWG necessitates a unique conceptualization comparable to the framework proposed by Jorm, or if a patient's general health literacy capacities can determine GWG outcomes. Understanding this distinction could not only lead to improved GWG health outcomes for women but could also yield a better understanding of the concept of health literacy as a whole.

In addition, given the results in our scoping review, it seems that the use of validated concepts and scales in this area of research could be improved. For example, despite the availability of the Palmer measurement tool that was previously created to capture women's attitudes toward GWG (Palmer et al., 1985), less than half of the studies that focused on attitudes toward GWG used this scale designed for this exact purpose. Use of validated measures such as the Palmer scale allows comparisons in findings across studies, which is needed to better understand how GWG outside the recommendations occurs. In the same way, studies in this area should make

use of established health literacy instruments to further improve the ability of both researchers and practitioners to compare findings across studies and populations.

It is important to consider how we can better address the concept of health literacy in GWG research because this could shed light on how and why inadequate and excessive GWG occurs. This review also demonstrates the general lack of GWG research across various demographic categories. Broadly, this research should continue to explore GWG across a variety of racial/ethnic and socioeconomic backgrounds rather than focusing on predominantly White and adequate socioeconomic status samples because low health literacy is more prominent in racially/ethnic minorities, older adults, and those who did not complete high school (Nielsen-Bohlman et al., 2004).

Implications for Practice

This scoping review provides an important current assessment of the state of health literacy science in the context of GWG. Although this review shows that the link between health literacy and GWG is woefully understudied, the components of general and GWG-specific health literacy offer promise as a framework to enhance practice. In Part 2, here, of the hypothetical case study of Caitlin, the mom-to-be, and her childbirth educator Jane, we illustrate how a health literacy framework might be applied.

First, in drawing on a general health literacy framework, Jane noted that the varied GWG information that Caitlin had received from people in her network, including her prenatal care provider, as well as from TV, left her confused. Because Jane was familiar with the current GWG recommendations for women's body mass index categories, she explored with Caitlin how she might locate credible source information on GWG—from print or electronic sources, as Caitlin preferred—based on IOM recommendations. Jane helped Caitlin further identify information sources targeting new mothers (vs. health professionals), so that she would be able to easily understand advice on reaching a GWG goal and how to translate that advice into her daily life. For example, Jane helped Caitlin find an easy to use website about the GWG range for her weight group (see resources at IOM & National Research Council, 2016). She also suggested how Caitlin might talk with her prenatal provider to ensure they shared the same goal about a healthy GWG for Caitlin.

Jane also drew on her knowledge of GWG-specific health literacy in working with Caitlin. For example, she addressed Caitlin's beliefs about the causes of excessive GWG, as expressed by her mother, as well as Caitlin's uncertainty about how excessive GWG might affect her, her baby, and the birth process. Jane shared with Caitlin that a healthy GWG would help her baby have a healthy birth weight and might reduce the likelihood of certain complications during the birth process. To help her recognize if her GWG remained in the recommended range as her pregnancy progressed, Jane suggested that Caitlin download a GWG tracker on which she could chart her weight and use in conferring with her prenatal care provider. Finally, Jane noted that Caitlin now seemed more confident about her ability to achieve a healthy GWG to benefit her and her baby.

The preceding case study gives a glimpse of how both the general health literacy components (finding, understanding, using, and communicating about) and our adapted framework for domain-specific health literacy related to GWG may delineate important areas for further development relevant to practice. First, it may be that assessing patient health literacy can help to tailor GWG information to a specific patient. Focusing on health literacy may save health-care providers and health educators' time and resources in the health education of childbearing women. Brief and easily scored assessments of the components of general health literacy applicable to busy practice settings would be ideal.

Second, in the practice context, women also may need specific health literacy capabilities to make appropriate decisions about how to manage GWG over the course of pregnancy. Such decisions involve a complex calculus. Even if health-care providers accurately recommended GWG targets to women, translating those recommendations into daily living varies by whether women are underweight, normal weight, overweight, or obese (Table 1; IOM, 2009). In addition to gains in body fat (which may be dependent on energy intake and expenditure), women's GWG also includes fetal growth and adaptations in body water, blood, and breast and uterine tissues that change over the course of pregnancy. Ranges for GWG accommodate variations among women; however, the six components of domain-specific health literacy we adapted from Jorm (2000) as well as those outlined through the general approach to health literacy provide additional tools to aid in the complex

Despite the known impact of health literacy on various health outcomes, findings from this scoping review highlight the lack of health literacy research in a GWG context.

calculus of understanding and managing GWG. Thus, in a practice context, the GWG health literacy framework we adapted moves the dialogue from a question “Do women know how much weight they should gain?” to “Do women have the knowledge, attitudes, and skills to make appropriate decisions about managing their GWG across the course of pregnancy?” If not, our hypothetical case study illustrates ways in which childbirth educators and others involved in care and education of pregnant women may use a health literacy framework to empower women in reaching healthy GWG goals.

Limitations

Because one of the goals of scoping reviews is to gain an overall understanding of an area or topic of study (Arksey & O'Malley, 2005), it does not include weighting of studies regarding bias in design; thus, this review did not address strength of evidence for various findings based on strengths and weaknesses of various studies.

CONCLUSION

Despite the known impact of health literacy on various health outcomes, findings from this scoping review highlight the lack of health literacy research in a GWG context. As a more patient-centered concept than others studied in previous GWG research, health literacy might offer a way of more deeply probing patients' personal understanding and capabilities that affect the various outcomes of adequate, inadequate, or excessive GWG. An initial step for research in this direction is a focus on exploring GWG using general and domain-specific approaches to health literacy. Based on findings from our scoping review, there is already a greater presence of research aimed at domain-specific attributes such as attitudes and beliefs and knowledge toward GWG. It is important that future work include valid and reliable health literacy assessments to establish a better understanding of the relationship between health literacy and GWG, especially in demographically diverse populations.

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