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Introduction

Health literacy is defined as ‘the personal characteristics and social resources needed for individuals and communities to access, understand, appraise and use information and services to make decisions about health’ (World Health Organization, 2015). It is a pressing global issue, as a significant proportion of the population faces health literacy challenges which can widen health inequalities (Mantwill and Diviani, 2019). Health literacy is widely recognised as a social determinant of health meaning it plays a fundamental role in influencing health outcomes (Nutbeam and Lloyd, 2021). The World Health Organization (WHO) has identified improving health literacy as a key strategy to reduce health inequalities and improve population health and wellbeing (World Health Organization, 2024). Despite its significance, challenges in health literacy persist globally, disproportionately affecting populations experiencing socioeconomic deprivation (Svendsen *et al.*, 2020).

Giving every child the best start in life is essential for reducing health inequalities and supporting positive development across the life course. To achieve this, parents and caregivers must navigate complex health information, healthcare systems, and services (Rahman *et al.*, 2024). Parents experiencing health literacy challenges are less likely to engage with preventative health services, adhere to medical advice, and overuse non-urgent healthcare services (Jensen *et al.*, 2024, Morrison *et al.*, 2019). This contributes to poorer health outcomes for children and families, increased economic strain on healthcare systems due to avoidable use, and a greater financial burden on society from preventable health issues (Morrison *et al.*, 2019, Lebano *et al.*, 2020). Therefore, early childhood (pre-school years), when children’s development is rapid and parents often engage with a range of health information and services, is a vital time to support parent’s health literacy needs to ensure they can make informed decisions for their child’s health and wellbeing (Unicef, 2024).

To enable researchers and policy makers to develop and implement effective and equitable health literacy interventions and strategies, it is essential to assess and understand the factors that support or hinder the target population’s ability to find, understand, appraise and use health information. Health literacy profiling, which involves identifying the specific health-related strengths and challenges within a population, is one way to achieve this (Melwani *et al.*, 2024). Health literacy profiling has been used to develop targeted interventions and enhance healthcare services by identifying specific health literacy needs (Jessup *et al.*, 2018, Boateng *et al.*, 2021). Qualitative vignettes have also been shown to be an effective, ethical and well-received method when exploring complex public health issues (Jackson *et al.*, 2015, Western *et al.*, 2024).

There is a lack of published data on parental health literacy in England, particularly among parents living in areas of high deprivation. This is regardless of evidence that individuals with limited financial and social resources are more likely to experience limited health literacy (Rowlands *et al.*, 2013). Parents in these contexts exhibit lower levels of engagement in research activities, highlighting the critical need for inclusive methodologies to ensure their perspectives are adequately represented (National Institute for Health and Care Research, 2022).

Therefore, this study aims to: (1) identify and compare the health literacy profiles of parents of preschool children (0–4-year-olds) in two cities in the south of England, and (2) develop a series of vignettes to illustrate the lived experience of parents with diverse health literacy profiles. Comparing the health literacy profiles across two cities will provide insight into potential regional differences, shedding light on contextual factors that may influence parental health literacy. The findings will not only enhance understanding of parental health literacy but also provide a foundation for future research and targeted interventions. As one of the first efforts to profile parental health literacy in the United Kingdom (UK), this research will contribute valuable knowledge to the field of health literacy.

Methods

Study design

This cross-sectional mixed methods study was conducted in Portsmouth and Southampton, two cities on the south-coast of England that have high levels of deprivation (Portsmouth City Council, 2023, Southampton City Council, 2023). Portsmouth and Southampton are among England's most deprived local authorities (ranked 57th and 55th of 317, where 1 is most deprived), with around 20% of children living in poverty (Public Health England, 2018).

This study forms part of a larger mixed methods project using the Ophelia (Optimising Health Literacy and Access) process, which is a systematic approach to co-designing and implementing health literacy interventions tailored to the specific needs of a target population (Beauchamp *et al.*, 2017a). This study comprised three components: a quantitative survey study, semi-structured focus groups, and triangulation of these data to develop vignettes representing a range of health literacy profiles.

Patient and Public Involvement and Engagement (PPIE)

Involving members of the public in research has been shown to increase the quality and relevance of research (Ryll, 2020, Carlton *et al.*, 2022). In this study, a female PPIE contributor who was a parent living in one of the research areas played an active role by refining the study design, contributing to the participant information sheets and consent forms, advising on recruitment strategies to reach parents seldom heard in research and supporting the vignette development.

Participant recruitment

Part 1: Survey

Using convenience sampling (Emerson, 2015), we aimed to recruit 100 parents of children aged 0-4 years from each city. Although there is no consensus on the minimum sample size required for cluster analysis to produce a suitable solution (Siddiqui, 2013), a minimum of 100 participants per city was estimated based on previous research to follow the Ophelia process (Cheng et al., 2020). Eligibility criteria included being over 18 years old, able to answer questions in English, and residing in the identified cities. Face-to-face recruitment occurred at community-based parent sessions, including library rhyme times, stay-and-play sessions, and a toy library. Online recruitment was conducted through partner organisations that provide support services to the target population, who shared a link to the survey on their social media platforms. Furthermore, one organisation distributed the survey link via text message to parents who had opted-in to receiving communications.

Part 2: Semi-structured focus groups

Focus group participants were selected through purposive sampling from those who completed the HLQ-Parent survey and had consented to being contacted for further involvement in the study. Three focus groups were planned in each city for 3-6 participants.

Part 3: Vignette development

To contribute to the validity of the vignettes three professionals working in community-based settings who support parents were invited to review and “sense check” the vignettes.

Data collection

Part 1: Survey

The survey included an information sheet, consent form, demographic questions (14 items) and the HLQ-Parent (44 items), which assessed health literacy across nine domains (Wahl *et al.*, 2022). Part 1 of the HLQ-Parent focused on the domains: “Feel that healthcare providers understand and support my child’s situation”, “Having sufficient information to manage my child’s health”, “Actively managing my child’s health”, “Social support for health” and “Appraisal of health information” using a 4-point Likert scale: strongly disagree (1), disagree (2), agree (3) and strongly agree (4). Part 2 focused on the domains: “Ability to actively engage with health care providers”, “Navigating the health care system”, “Ability to find good health information” and “Understand health information well enough to know what to do” using a 5-point Likert scale: cannot do or always difficult (1), very difficult (2), quite difficult (3), easy (4) and very easy (5).

The survey was conducted between 18th July and 15th December 2022. Participants had the option to complete a paper or online version at a time and place convenient to them, or in an interview format with the researcher reading and recording responses. The online survey was hosted on JISC, an online platform for the creation, distribution and analysis of questionnaires (Jisc, 2022).

Demographic items included self-reported year of birth, sex, number of children in household, highest level of education (secondary school or below, completed college, degree or above)[1], employment status (full-time, part-time, unemployed), if English is spoken in the home, self-reported long-term condition and hospital emergency department use in last 12 months for parent and/or child. Contact information was collected from participants if they consented to be entered into a draw to receive a £20 voucher as a thank you for their time or if they indicated that they were interested in taking part in further research, including semi-structured interviews, focus groups and/or workshops.

Part 2: Focus groups

Participants who indicated interest in further involvement in the research at the end of the survey were contacted by email or telephone to see if they were interest in taking part in a focus group. Those interested were then sent the participant information sheet and consent form and were asked to confirm availability. In-depth semi-structured focus groups were conducted to explore the health literacy strengths and challenges of parents of pre-school children. The semi-structured focus group guide was developed to explore the nine domains of the HLQ-Parent, focusing on the participants health literacy strengths and challenges. In Southampton, three face-to-face focus groups were held in a confidential community setting, with a crèche provided for attending parents. Three parents were invited to each focus group (n=9). During the focus groups, participants were encouraged to share additional thoughts or concerns about managing their child's health. Notes were taken by the researcher, and discussions were audio-recorded with participant consent. All focus group participants received a £10 voucher as a token of appreciation.

In Portsmouth, two online focus groups were initially scheduled, as no crèche facility was available, and parents had expressed a preference for an evening session. Three parents were invited to each focus group (n=6). However, no parents attended the scheduled or rescheduled online sessions. To address this, an alternative approach was implemented whereby draft vignettes were created using quantitative survey data, demographic information, and insights gathered during interactions at family hubs. These vignettes were introduced during two stay-and-play sessions, where parents provided consent and participated in discussions. Vignettes were read aloud to small groups, allowing parents to share their perspectives on the scenarios.

Data analysis

Part 1: HLQ- Parent

The data were analysed using IBM SPSS Statistics version 27. Descriptive statistics summarised participant characteristics. Hierarchical cluster analysis with Ward's method was used to group participants with similar health literacy scores into clusters, forming the basis of the health literacy profiles (Batterham *et al.*, 2014, Beauchamp *et al.*, 2017b). This method minimises within-cluster variance by evaluating the sum of the squared Euclidean distance, to create compact, homogeneous clusters (Nielsen and Nielsen, 2016). Scale scores for each cluster were presented as means and standard deviations (SDs).

Cluster solutions ranging from 3 to 16 clusters were examined, and decisions were informed by recommendations presented in Beauchamp *et al.* (2017b). The final selection was guided

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[1] Secondary school in the UK refers to compulsory education for 11-16-year-olds, while college (also referred to as further education) typically caters to 16-18-year-olds, although adults can also attend.

by standard deviations of HLQ-Parent scores, demographic data, and the agglomeration schedule's distance coefficient. A standard deviation >0.6 indicated significant within-cluster variation, suggesting an inadequate solution, though smaller clusters might naturally show higher variability. Finally, the distance coefficient of the agglomeration schedule, which serves as a numerical indicator of the clusters, was considered whereby a significant gap or sudden jump in the distance coefficient suggests that the solution preceding the gap represents an optimal clustering solution (Kent, 2015). Dendrograms were produced as visual representations of the agglomeration schedule, to support the interpretation of the cluster analysis results and to identify any outliers or anomalies in the data that required further investigation (Forina *et al.*, 2002). Conditional formatting was applied to the cluster analysis results using traffic light colour coding (green for highest, red for lowest) to visually highlight key differences in health literacy profiles. The colour coding (as shown in Table 2) is relative to other scores in the row and does not indicate predetermined high or low scores for each scale (Beauchamp *et al.*, 2017a). Additionally, the demographic data of each cluster were considered as part of the reviewing process to identify the optimal number of clusters, as clusters with similar health literacy profiles but differing demographics may require different intervention strategies.

Normality was assessed using Skewness, Kurtosis, the Kolmogorov-Smirnov test, and visual inspection of histograms. Based on these results, a series of independent sample t-tests were conducted to compare mean scores of the nine domains between the two cities.

Part 2: Semi-structed focus groups

While no formal analysis is required of the qualitative data in the development of vignettes (Beauchamp *et al.*, 2017), a deductive Framework Analysis approach (Gale *et al.*, 2013) was used to systematically manage the qualitative data from the semi-structured focus groups, interview, and researcher notes. This involved familiarisation with the data, grouping data using a predefined framework based on the HLQ-Parent domains and questionnaire items. The themes and quotes were then organised into a matrix to facilitate interpretation and support vignette development.

Part 3: Vignette development

The vignettes were developed through a structured four-step process, informed by previous work using an explanatory sequential approach (Holley and Gillard, 2018, Tremblay *et al.*, 2022, Fetters *et al.*, 2013). This approach triangulated the quantitative health literacy profiles (Part 1; HLQ-Parent data and demographic information) with qualitative focus group data (Part 2) to create narratives reflecting the diverse health literacy profiles identified through cluster analysis.

Step 1: Cluster demographics such as age, language spoken at home and educational attainment were analysed to establish key attributes for each vignette.
Step 2: Quotes and thematic insights from the framework analysis of the qualitative data were systematically mapped to the high and low item scores within each HLQ-Parent domain.
Step 3: The researcher wrote the vignettes in the first person, ensuring a personalised and immersive narrative based on the triangulated data.
Step 4: Each vignette was reviewed by the PPIE contributor before the vignettes were 'sense-checked' for accuracy and realism by frontline staff working with parents.

Vignettes were written in Microsoft Word (Office 365) to achieve a Flesch-Kincaid reading score of 80-100, ensuring an accessible reading age for the general public (Stockmeyer, 2009).

Ethical considerations

Ethical approval was obtained from the University of Winchester Ethics Committee (ethics approval number EC220606).

Results

Part 1: Survey

A total of 176 participants completed the HLQ-Parent (Table 1). In Portsmouth (n=71; age range: 18–48 years; 96% female), 39 participants completed the survey online, 28 on paper, and 4 via interview. In Southampton (n=105; age range: 21–59 years; 100% female), 37 completed the survey online, 67 on paper, and 1 via interview. One survey from Southampton was excluded due to inconsistent responses, reducing the analysed sample to 175. Approximately one-third of participants (28.2% in Portsmouth; 34.6% in Southampton) spoke a language other than English at home, nearly half of the sample (55.0% in Portsmouth; 46.1% in Southampton) reported their highest education as college level or below, while over a third (36.6% in Portsmouth; 30.8% in Southampton) had taken their child to the emergency department in the past 12 months.

Table 1: Participant Demographic Information

	Portsmouth **N (%)**	**Southampton** **N (%)**
Total	71	104
Sex		
Female	68 (95.8%)	104 (100%)
Average number of children (0-4years)	1 (range 1-2)	1 (range 1-2)
Average number of children (5-16years)	0 (range 1-4)	1 (range 1-4)
Age (mean ± SD)	33± 6	33± 7
Educational attainment		
Secondary school or below	8 (11.3%)	7 (6.7%)
Completed college	31 (43.7%)	41 (39.4%)
Degree or above	32 (45.1%)	56 (53.8%)
Language*		
Speak English at home	67 (94.4%)	95 (91.3%)
Speak other language at home	20 (28.2%)	36 (34.6%)
Employment		
Full-time	7 (9.9%)	14 (13.5%)
Part-time	12 (16.9%)	23 (22.1%)
Medical^		
Long-term condition of parent	21 (29.6%)	59 (56.7%)
Long-term condition of child	5 (7.0%)	7 (6.7%)
ED attendance of parent (in last 12 months)	8 (11.3%)	18 (17.3%)
ED attendance of child (in last 12 months)	26 (36.6%)	32 (30.8%)

Note: ED, Emergency Department; SD, Standard deviation
*Participants could report both speaking English and other language at home
^ Long-term conditions were self-reported as one or more of the following: Arthritis, Back pain, Heart problems, Asthma or lung condition, Cancer, Depression or anxiety, Diabetes, Stroke, Other.

The overall parental health literacy scores are presented in Figure 1. The two cities demonstrated similar overall scores for the majority of domains. However, Southampton participants demonstrated significantly higher scores than Portsmouth participants for Domain 4 “Social support for health” (2.87 ± 0.46 vs. 2.47 ± 0.47), Domain 5 “Appraisal of health information” (2.96 ± 0.52 vs. 2.26 ± 0.51) and Domain 8 “Ability to find good health information" (3.94 ± 0.49 vs. 3.45 ± 0.56; all $p<0.01$). Domain 1 “Feel that healthcare providers understand and support my child’s situation” was the highest-scoring domain for Portsmouth participants, while Domain 8 "Ability to find good health information" was the highest-scoring domain for Southampton participants. Domain 5 "Appraisal of health information" was the lowest-scoring domain for Portsmouth participants, while Domain 2 "Having sufficient information to manage my child's health" was the lowest-scoring domain for Southampton participants. Reliability for individual subscales of the HLQ-Parent was acceptable with Cronbach’s alpha ranging from 0.75 (Domain 2) to 1.00 (Domain 7).

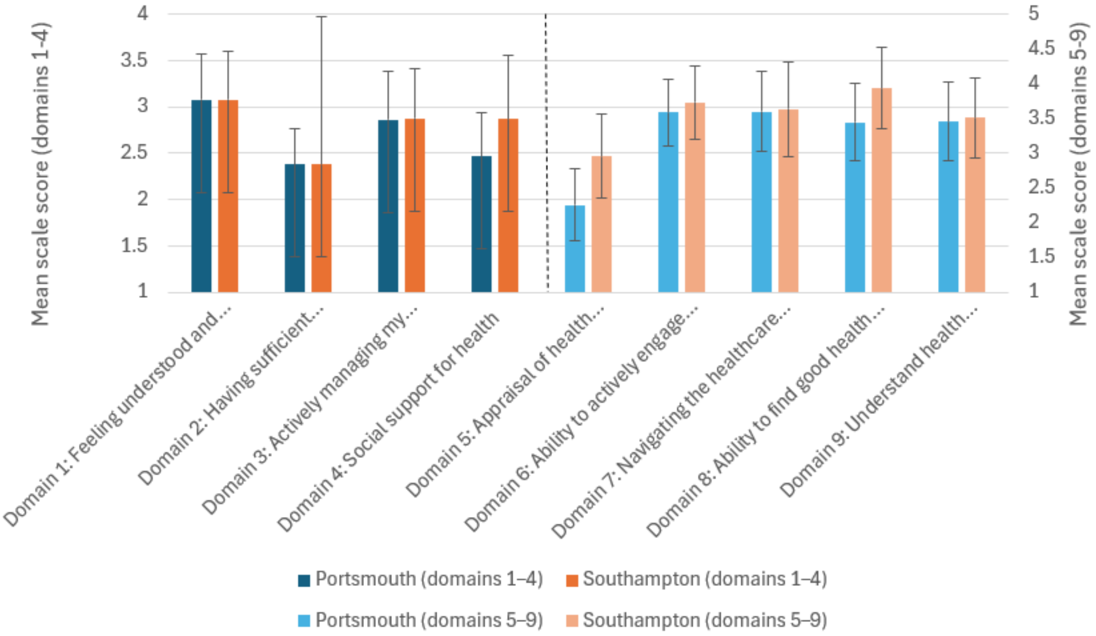

Figure 1: Mean ± SD HLQ-Parent Domain Scores for Portsmouth and Southampton Participants

Cluster analysis

A total of 16 cluster solutions were examined during the cluster analysis process for both cities. However, based on the standard deviation, agglomeration schedule, demographic characteristics and distribution of health literacy scores, a four-cluster solution was identified as the optimal cluster solution for both cities.

A detailed picture of each cluster profile along with demographic characteristics is shown in Table 2 (Portsmouth) and Table 3 (Southampton).

Table 2: Portsmouth parental health literacy profiles based on a four-cluster solution

Cluster	**1**	**2**	**3**	**4**
Number in cluster (n)	8	22	33	8
(%)	11.3	31.0	46.5	11.3
1. Feeling understood and supported by healthcare providers*	3.78	3.32	2.80	2.88
2. Having sufficient information to manage child's health*	2.88	2.56	2.27	1.84
3. Actively managing my child's health*	3.78	3.08	2.58	2.50
4. Social support for health*	3.18	2.67	2.23	2.15
5. Appraisal of health information*	3.08	2.45	2.02	1.90
6. Ability to actively engage with healthcare providers#	4.33	3.80	3.47	2.75
7. Navigating the healthcare system#	4.46	3.81	3.46	2.71
8. Ability to find good health information#	4.23	3.73	3.22	2.80
9. Understand health information well enough to know what to do#	4.33	3.74	3.28	2.60
Demographic details				
Mean age	33.9	33.4	31.7	33.3
% female	100	95	94	100
Mean no. child aged 0-4 years	1	1	1	1
Mean no. of children aged 5-16 years	-	-	1	1
% Language other than English spoken at home	11.3	5.6	8.5	2.8
% Employed	87.5	40.9	57.6	37.5
Highest educational attainment				
% Completed secondary school or below	12.5	9.09	15.2	-
% Completed college	37.5	36.4	51.5	37.5
% Completed degree of above	50.0	54.6	33.3	62.5
Long-term conditions (LTC)				
% Parent living with ≥ 1 LTC	25.0	31.8	30.3	25.0
% Child living with ≥ 1 LTC	-	13.6	6.06	-
Emergency department attendance				
% Parent attended ED ≤ 12 months	-	22.7	9.09	-
% Child attended ED ≤ 12 months	25.0	36.4	48.5	-

*HLQ-P mean score (domains 1-5 ; max score 4)

HLQ-P mean score (domains 6-9 ; max score 5)

Note: Colour coding of cells within clusters are based on green (highest) and red (lowest) health literacy. Scores are only relative to other levels in the row and do not indicate predetermined high/low scores related to each scale.

Table 3: Southampton parental health literacy profiles based on a four-cluster solution

Cluster	**1**	**2**	**3**	**4**
Number in cluster	34	29	32	9
(%)	32.7	27.9	30.8	8.7
1. Feeling understood and supported by healthcare providers*	3.44	2.88	3.00	2.69
2. Having sufficient information to manage child's health*	2.74	2.19	2.26	2.08
3. Actively managing my child's health*	3.31	2.80	2.66	2.27
4. Social support for health*	3.27	2.79	2.65	2.40
5. Appraisal of health information*	3.44	2.63	2.99	2.16
6. Ability to actively engage with healthcare providers#	4.19	3.83	3.43	2.84
7. Navigating the healthcare system#	4.14	3.83	3.28	2.54
8. Ability to find good health information#	4.34	4.09	3.59	3.27

9. Understand health information well enough to know what to do#	4.07	3.75	3.01	2.49
Demographic details				
Mean age	33.4	33.2	31.6	30.9
% female	100	100	100	100
Mean no. child aged 0-4 years	1	1	1	1
Mean no. of children aged 5-16 years	1	1	1	1
% Language other than English spoken at home	23.5	37.9	43.8	33.3
% Employed	64.7	69.0	59.4	66.7
Highest educational attainment				
% Completed secondary school or below	8.8	6.9	3.1	11.1
% Completed college	26.5	41.4	46.9	55.6
% Completed degree of above	64.7	51.7	50.0	33.3
Long-term conditions				
% Parent living with one or more long-term condition	52.9	62.1	56.3	55.6
% Child living with one or more long-term condition	5.9	3.4	12.5	-
Emergency department attendance				
% Parent attended ED in last 12 months	17.6	10.3	18.8	33.3
% Child attended ED in the last 12 months	35.3	24.1	31.3	33.3

*HLQ-P mean score (domains 1-5 ; max score 4)
#HLQ-P mean score (domains 6-9 ; max score 5)
Note: Colour coding of cells within clusters are based on green (highest) and red (lowest) health literacy. Scores are only relative to other levels in the row and do not indicate predetermined high/low scores related to each scale.

Part 2: Focus groups

The demographic details of the focus group participants can be seen in supplementary file A. In Southampton each semi-structured focus group or interview lasted approximately 40 minutes (range 33–49 minutes), covering the parents’ experiences of local health information and services for their children. In one focus group the parents reported the challenges of navigating primary care for their children. This was emphasised by a parent from Poland who said, “I felt so scared, the [healthcare] system looks so different here, I’m from Poland and I just didn’t know what to do”.

In Portsmouth parents provided valuable qualitative insights based on the preliminary vignettes created by the researcher. They suggested potential expansions and identified additional issues to be incorporated. When discussing the low item scores in Domain 4 “Social support for health”, one parent shared their experience of being new to the city and lacking social support from people who understood the local services and support available. The group also discussed the role of family social support, noting how mental health challenges can impact a person’s ability to provide support.

Part 3: Vignette development

Eight vignettes were created, one for each health literacy profile identified. An example of vignette development through triangulation of quantitative and qualitative data is provided in supplementary file B. Four unique vignettes were created for each city (see supplementary files C and D). The initial vignettes were reviewed by the PPIE contributor, leading to minor amendments. For example, they suggested adding the word 'energy' to one vignette sentence, changing it to: 'I just don’t have the time or energy to spend ages looking up stuff,' this was to emphasise how tired the parent felt. All vignettes were given a fictional name by the researcher. The vignettes were then "sense-checked" by three front-line professionals working with parents to ensure they accurately reflected the types of issues parents were facing. No further amendments were suggested after this review. Table 4 presents the vignette for Portsmouth's Cluster 4, and Table 5 presents the vignette for Southampton's Cluster 4.

Table 4: Portsmouth Cluster 4 Vignette ‘Roxana’

Brief overview from cluster analysis:
Number in cluster: 8 (11.3%)
Average age: 33
Average number of children: 1 (0-4 years) and 1 (5-16 years)
Education: This cluster have the highest educational attainment, with 62.5% having a degree qualification or above
Employment: This cluster are least likely to be employed (37.5%)
ED attendance: No one in this cluster reported using emergency department in the last 12 months for themselves or their child.
Highest-scoring domain: Domain 1 “Feeling understood and supported by healthcare providers”.
Lowest-scoring domain: Domain 2 “Having sufficient information to manage child’s health”.
Overall, this cluster represents well educated parents who do not score as highly across all nine domains compared to the other clusters, they especially struggle to have sufficient information to manage their child’s health and critically appraising it.

Hey, I'm Roxana! I'm 27 and I've got a 3-year-old and almost a 5-year-old. Life's hectic right now, I really want to work and use my degree, but I’m new to area and I just don’t have time to looking for a job.
We had to get away from our hometown due to family problems, so we moved to Portsmouth. I didn’t know anyone before I moved here. I've just started chatting to a couple of mums that live near but we're still getting to know each other, I can't exactly ask them for help just yet (domain 4). I still haven’t registered me or the kids with a GP yet (domain 7). Most days it’s hard to get out the house and with being new to the area I’m not too sure what to do. I do need someone to talk to, I can’t talk to my mum, she has her own challenges, you know, mentally and stuff. She gets quite unwell, but I don’t really get involved or talk to her now, maybe one day when the kids are a bit older (domain 4).
When it comes to getting information on health for the kids I just don’t have the time or energy to spend ages looking up stuff and reading if, I have a quick look online and just check it’s nothing serious (domains 2 & 5). I don’t want to waste anyone’s time so it would have to be really really bad for me to take the kids to the hospital (domains 2 & 9).

Table 5: Southampton Cluster 4 Vignette ‘Kasia’

Brief overview from cluster analysis:
Number in cluster: 9 (8.7%)
Average age: 31
Average number of children: 1 (0-4 years) and 1 (5-16 years)
Education: 61.7% completed college or below
Parent long term condition: 55.6% of parents in this cluster self-reported to be living with a long-term condition.

ED attendance: largest proportion of parents who had attended the emergency department for themselves in the last 12 months (33.3%). **Highest-scoring domain:** Domain 1 "Feeling understood and supported by healthcare providers". **Lowest-scoring domain:** Domain 9 "Understand health information well enough to know what to do". Overall, this cluster represents parents who score lowest across all nine domains of the HLQ-Parent compared to other clusters. This cluster struggle to understand health information well enough to know what to do.
Hi, I'm Kasia I'm 29 and I'm mum to Shay who is 18 months and I'm pregnant. I was diagnosed with autism just before I gave birth to Shay. I completed a catering course at college and now I work part time in a café. I didn't go to any pregnancy classes when I was pregnant as everything was online. I don't like Facetime or anything, I won't use it. I'm not going to go to any pregnancy classes this time either as they're just for people who don't already have kids (domain 9). I do really want to breastfeed this time. I wanted to last time, but I didn't get the help I needed. When I was in hospital after giving birth, I found it difficult to ask for help. I didn't want to keep asking different people for help. I didn't know them, so it was really difficult to ask them for help (domains 1 & 6). I didn't hear from my health visitor for nearly a year. The midwife signed me off then I think I was with a health visitor. I didn't know if I was meant to call them or if they were meant to call me. So, I just waited for them to contact me (domains 7 & 9). I thought everything was going on fine, so I didn't need to contact them. But then when I saw the health visitor at the one year check she seemed confused that Shay hadn't been weighed or been to a clinic for months. The health visitor said contact us if you need help, so I assumed they'd contact us if we needed to do anything like weighing her (domains 2, 3 & 9). I do have family that live local, but I wouldn't say they are that supportive. They ask why I'm doing things like that, and they give Shay things I say she can't have. I do look on Google for health information, but I'm not too sure how to work out if the information is true or not (domain 5). I never know when I look things up if they're actually true or not. I go to Google, but then Google never gives me accurate information. So, I just don't know enough to believe it or not (domains 5, 2 & 8).

Discussion

The cluster analysis revealed both commonalities and distinctions in health literacy profiles of parents in Southampton and Portsmouth. The study identified four distinct health literacy profiles in each city, with similar cluster structures observed in both. Cluster 1 was identified as consistently having the highest health literacy scores, while Cluster 4 generally held the lowest scores across all domains. Both cities demonstrated low scores in Domain 2, 'Having sufficient information to manage my child's health,' the lowest-scoring domain in three of the four clusters in Southampton and two clusters in Portsmouth. This suggests that, regardless of broader health literacy strengths, many parents face challenges in accessing or understanding the information needed to manage their child's health. This consistent finding may highlight a gap in how health information is currently communicated and provided to parents. However, it must also be acknowledged that other factors, such as health literacy responsiveness within health systems (Trezona *et al.*, 2017), may also be relevant. During the focus groups parents expressed feeling that they lacked enough information to make informed decisions about their child's health. This suggests the need for improved strategies to deliver comprehensive, accessible health information to ensure parents have the information they need to effectively manage their child's health.

Another low scoring area across all clusters in Portsmouth was Domain 4 "Social support for health", reflecting a broader issue identified in other contexts. During the vignette development, parents in Portsmouth spoke of the challenges of relocating to the city, having no friends, and not knowing where to go for support regarding their own and their child's health and well-being. Research highlights the benefits of social support for health (Gilmour et al., 2020; Hirose et al., 2020, Kim & Thomas., 2019) with indications that social support positively influences health behaviours, motivation and quality of life. Parents also note the transition into parenthood as being a stressful period in which social support can have a significant impact on the health of the parent (Schobinger *et al.*, 2022). McLeish et al. (2021) investigated the impact of social support provided to first-time mothers in England by healthcare professionals. Unsurprisingly, they discovered that the quality of social support provided to participants varied greatly. The most prominent theme identified in this qualitative study related to the evaluation and informational support from health professionals, where parents felt most supported when they received timely health information and positive feedback on their parenting. This highlights the need for health professionals to adopt communication strategies that prioritise accessible, timely and positive interactions with parents. Further research is warranted to explore the specific role frontline professionals have in facilitating social support for health for parents.

It is noteworthy that no parents in Cluster 4 in Portsmouth reported using the emergency department in the last 12 months, compared to a third of parents in Cluster 4 in Southampton. Evidence suggests that parents with limited health literacy often overuse emergency services (Montoro-Perez *et al.*, 2023, Morrison *et al.*, 2014), however this relationship was not observed in this study. Variations in the use of emergency services among parents warrants further exploration, as such difference may reflect underlying factors including access to healthcare, cultural attitudes, or the availability of community-based resources (Perrin *et al.*, 2020). Understanding these factors could provide valuable insights into how to better support parents and optimise healthcare usage.

Challenges in health literacy could be reflective of difficulties with translation, particularly for parents who speak a language other than English at home. The demographic characteristics of the parents in Cluster 4 varied between cities, highlighting the need for tailored interventions to meet the specific needs of those in the cluster. For example, 33.3% of parents in Cluster 4 in Southampton spoke a language other than English at home compared to just 2.8% in Portsmouth. This suggests that parents may benefit from greater translated resources and services in Southampton. Southampton parents were more likely to be employed (66.7% compared to 37.5%) but with a lower educational attainment. This indicates that health literacy interventions and services should be designed with flexibility to accommodate working schedules, ensuring they reach those who need support the most. This aligns with previous research on organisational health literacy, which has emphasised the need for healthcare services to be responsive to the accessibility needs of their users (Meldgaard *et al.*, 2023, Meggetto *et al.*, 2020).

It must be noted that it is important not to assume a parent's health literacy or education level based only on their employment status. Despite a high proportion of respondents educated to degree level or above, these parents did not always report the highest health literacy scores on the HLQ-Parent (see Tables 3 & 4). For instance, Cluster 4 in Portsmouth had the lowest health literacy scores across all domains, despite having the highest percentage of respondents with degree-level education. While higher education is often linked to improved health literacy, research indicates that advanced education does not guarantee strong health literacy skills (Bennett *et al.*, 2009). It is important to note that health literacy is context specific, meaning it can vary depending on an individual's circumstances, such as their age, stage or life or the experience of receiving a new diagnosis (Sykes *et al.*, 2025, Atanasova and Kamin, 2022). This helps explain why some with high education attainment may still exhibit low health literacy scores. For parents of preschool-aged children, navigating paediatric healthcare can present specific challenges, including unfamiliarity with services and increased interactions with healthcare providers (Baldwin *et al.*, 2019). Parental health literacy encompasses both understanding health information and advocating for a child, adding complexity to healthcare navigation (Johnston *et al.*, 2015).

The findings of this study highlight the significant variation in health literacy levels across parents, making it difficult to predict health literacy levels based solely on demographic factors such as education or employment. This suggests that while targeted health literacy interventions are important and should be prioritised when resources allow, universal messages must be made more accessible and easier to understand for those with limited health literacy. By ensuring that public health communication is clear and inclusive, we can improve its reach and effectiveness, ensuring that health information and services are accessible to those with greatest need.

Strengths & Limitations

The strengths of this study lie within the mixed methods approach and inclusion of a PPIE contributor to address an under-researched area. The HLQ-Parent provided a standardised measure of health literacy, meaning the findings from this study can be easily comparable to future studies using the HLQ-Parent. The multimodal approach for parents to complete the HLQ-Parent (paper survey, interview with researcher, online) supported study participation particularly among individuals with low literacy skills and digitally excluded individuals.

Although no parents from Portsmouth attended the focus groups, other studies have successfully developed vignettes based on survey data, researcher knowledge and experts in the field of study (Spencer *et al.*, 2024, Anwar *et al.*, 2021). However, this study took an alternative approach to collecting qualitative data to enhance the robustness of the vignettes. Importantly both the focus groups and qualitative data collected at the stay-and-play groups provided important contextual insights ensuring the vignettes authentically reflect the experiences of parents of pre-school children.

The study captured diverse participants, including nearly 12% full-time workers, an often-underrepresented group. Approximately one-third of participants spoke a language other than English at home. While this is higher than local demographic data, where 9.2% of Portsmouth residents and 15.4% of Southampton residents do not have English as their main language (Office for National Statistics, 2021), it is important to note that participants could report speaking both English and another language at home. Despite this, it must be noted that as the surveys were only available in English, this may also have impacted participant recruitment by limiting the pool of potential participants. Interestingly, 50% of participants were educated to degree level, exceeding local averages, which aligns with the sample's younger age group and expanding higher education access in the UK.

A limitation of this study was the inability to reach the target sample size of parents completing the HLQ-Parent in Portsmouth, which may have impacted the reliability of the cluster analysis results (Dalmaijer *et al.*, 2022). Additionally, the small sample size of focus group participants restricted the diversity of perspectives captured, potentially limiting the transferability of the qualitative insights. Male caregivers were also underrepresented in this study, highlighting the need for further research into fathers' health literacy strengths and challenges. Furthermore, the study would have been strengthened if additional factors that could affect health literacy were captured (e.g., support from a second parent or grandparents).

Future Application

The vignettes produced in this study will be used in the next stage of the Ophelia process which involves conducting community-based workshops utilising the vignettes to stimulate discussion and generate health literacy interventions and solutions (Batterham *et al.*, 2014). Local frontline practitioners, volunteers and parents will come together to generate practical solutions to the challenges and needs portrayed in the vignettes. Following the workshops, recommendations will be made to improve health literacy within the community, with a focus on using local strengths and pre-existing resources. This process may also serve as a catalyst for future research into parental health literacy, including parents' preferences for accessing health information.

Conclusion

The findings of this study emphasise the importance of tailored approaches to improving parental health literacy. The identification of four distinct health literacy profiles in each city demonstrates that sub-groups of the parent population face unique challenges and require targeted strategies for support. A one size fits all approach to increasing parental health literacy risks not reaching those who need the most support, reinforcing the need for interventions that are responsive to the specific characteristics and circumstances of each cluster. While targeted interventions are essential, it is equally important to ensure that public health messaging is accessible and effective for those with limited health literacy.

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