Original Article

Health Literate Access to Information on COVID-19 Infection and Allergy Prevention by Parents of Infants

Anja Alexandra Schulz and Markus Antonius Wirtz

Department of Research Methods in Health Sciences, University of Education, Freiburg i.Br., Germany

Abstract: *Background*: Parents of infants need to be able to access valid health information to preventively protect their infants' health development. *Aims*: To investigate the self-assessed literacy of parent couples in accessing information on general health, COVID-19 infection (COVID-19-IP), and early childhood allergy prevention (ECAP). To determine the dependence of the psychometric properties of the access items of the European Health Literacy Survey Questionnaire (HLS-EU-Q47) on domain and gender. *Method*: N = 128 mothers and fathers of infants answered the 12 access items of the HLS-EU-Q47 in the original version and in COVID-19-IP and ECAP versions. Variance decomposition of the repeated measures 2 × 3 × 12-data was conducted. *Results*: Within the parent couples the individual Access items correlate at most weakly for COVID-19-IP (r = .081–.180), moderately for General Health (r = .096–.315), and partially highly for ECAP (r = .179–.499). While there is no main effect of gender, self-assessed access literacy is generally highest for COVID-19-IP (variance component domain: 24.6%). For the two items on support, however, the highest approval ratings are obtained for general health (variance component domain × item: 13.5%). *Limitations*: Self-assessments are at most proxy indicators of the actual performance disposition. *Conclusions*: Health-literate Access to health information does not differ between mothers and fathers, although substantial concordance within couples exists only for ECAP and marked differences are evident between health domains. The validity of self-reported data on parents' health literacy (HL) can be significantly improved by analyzing the concordance within couples for specific health domains and by focusing on specific facets of the multidimensional HL construct.

Keywords: Parental Health Literacy, access to information, European Health Literacy Survey (HLS-EU), COVID-19 infection prevention, early childhood allergy prevention

Parents of infants are faced with the challenge of protecting the health of their child in the best possible way. Parental health-related protective behavior not only concerns preventing immediate threats to health, but also strengthening the child's health resources, supporting the healthy long-term development of the organism (de Buhr & Tannen, 2020; Ferrante et al., 2020). To cope with these particular challenges in this new and responsible life situation, parents have to be capable of identifying and dealing with available information in a health-literate manner (Pawellek et al., 2023). Accordingly, competent *Access* to health information – that is, the ability to seek, find and obtain health information (Sørensen et al., 2013) – is assumed to be fundamental for health literate information processing and use in health literacy (HL) models. Effective *Access* to information has to be understood as being determined by individual knowledge, skills and abilities (parental *search literacy*) as well as the availability, comprehensibility and practicability of the information (Heiberger et al., 2023). The capability to literately search for and *Access* to health information represents as a central component of HL, which incorporates both the characteristics of the individuals searching and the information available (Liu et al., 2020). *Access* to health-related information forms the basis for further understanding and appraisal processes, which ultimately underlie the parents' preventive health actions (de Buhr & Tannen, 2020).

Access to Health Informations by Mothers and Fathers

Access to appropriate, evidence-based information forms the basis for implementing health-literate child-care behavior following partnership-based decision-making processes (including the ability to receive, understand and communicate information; Harrison, 2004). Autonomy and voluntariness require the availability of and *Access* to appropriate information, not only for medical decisions (Aarthun & Akerjordet, 2014), but also for the parental everyday childcare (Atkinson et al., 2021).

https://doi.org/10.1027/2512-8442/a000172

Differences in the way mothers and fathers approach information search are evident, due to psychological, social, and cultural factors as well as by time resources (Baumann et al., 2020; Diniz et al., 2021; Serbin et al., 2014). Studies suggest that mothers tend to engage more actively in seeking health information, often motivated by a heightened sense of responsibility for their child's immediate well-being. Increased maternal involvement is driven by societal expectations that position mothers as the primary caregivers, leading them to seek confirmation and reassurance from a variety of sources (Gaynor et al., 2024). Irrespective of the parental role, women mostly show higher general HL values than men (Sørensen et al., 2015).

Fathers, on the other hand, are generally less engaged in exhaustive information searches and tend to rely more on a limited set of trusted sources, such as healthcare professionals or information shared by their partners (Tokhi et al., 2018). These differences can be attributed to traditional gender roles, which historically cast fathers in a supportive role in caregiving, leading to a less immediate sense of urgency in health-related information gathering. While fathers are increasingly involved in child-rearing, they may defer to mothers on specific health decisions when specific knowledge is required (Yogman & Eppel, 2022). Wynter and colleagues (2023) identified barriers that may limit fathers' *Access* to, engagement with and benefit from health information and services in the antenatal and postnatal period. Strengthening the ability of fathers to *Access* health information is considered as essential not only to better shape child-related care activities, but also to positively influence the couple's situation and fathers' own health (Aborigo et al., 2018; Tokhi et al., 2018). This is particularly important because the care system is generally supposed to insufficiently recognize and support the active role of fathers (Wells, 2016). Disparities between mothers and fathers in information-seeking behaviors may lead to differences in knowledge levels and attitudes toward preventive health care (Yogman & Eppel, 2022). This may affect co-parenting, as uneven knowledge distribution can affect decision-making and collaboration on issues such as dietary restrictions, prevention strategies, and hygiene practices (Feinberg, 2002; Ferrante et al., 2020).

Parental Access to Information Regarding General Health, Early Childhood Allergy Prevention, and COVID-19 Infection Prevention

For mothers of newborns, there are consolidated findings on *Access* to information on general health (GH), early childhood allergy prevention (ECAP), and COVID-19 infection prevention (COVID-19-IP) (Wirtz et al., 2022). Mothers reported a strikingly high health literate *Access* for the COVID-19-IP-domain, mainly for aspects that are particularly important for dealing with disease symptoms, acting in medical emergencies and avoiding health risks in everyday life. The increased health-literate *Access* thus appears to be primarily due to the increased public availability of COVID-19 related information in the survey period in 2021. Comprehensive availability of information thus seems to predominate in the subjective judgments of mothers, although the challenges in selecting reliable and trustworthy information on COVID-19-IP information could also pose critical obstacles here ("infodemics"; Abuhaloob et al., 2024; Urman et al., 2025).

This domain specificity of health literate *Access* is also suggested by the weak to moderate correlations at the level of the individual *Access* items between the domains ECAP and COVID-IP and GH and COVID-19-IP. For GH and ECAP, correlations are higher in the range r = .296–.635 (Wirtz et al., 2022). Accordingly, health literate *Access* must be understood as distinctly influenced by the specific health problem and the information available for it. This is in accordance with the assumption, that successful *Access* to health information is determined by the characteristics of information material and offers – in addition to personal demand, personal claim, and individual search literacy (Heiberger et al., 2023; Liu et al., 2020). Moreover, a distinct interaction of items and domains was found (7% variance explained by interaction) and there was no measurement invariance of the 12 *Access* items between the domains (Wirtz et al., 2022). Accordingly, the 12 European Health Literacy Survey Questionnaire (HLS-EU-Q47) *Access* items partly represent specific information components that would not neglected if only the total value *Access* was considered. Thus, analyzing individual item contents between the domains provides significant added value.

The research objectives of this article are to examine these findings reported by Wirtz et al. (2022) on *Access* to health information by including the perspective of fathers. This allows to analyze the *Access* data in the according health domains of parent couples in an integrated manner. It has to be noted, that the parents participated in a study that focused on HL in the ECAP domain. In order to be able to appropriately contextualize the *Access* abilities for the challenging health topic of ECAP, the parental *Access* abilities for information on GH and COVID-19-IP were surveyed in parallel as a reference. It should be noted here that ECAP refers to parental prevention of the infant's health, while prevention in the GH and COVID-19-IP domains refers on health information that also concerns the health of the parents themselves. In the present study, parents of newborns and infants are examined, since the learning and habituation experience of the organism immediately after birth is considered particularly crucial for allergy prevention (Roberts et al., 2023). The first 1,000 days after birth are considered a "window of opportunity" within which the development of tolerance and resistance to allergens in the developing body can be influenced most effectively. However, parental ECAP is a particularly challenging field of information, as the relevant knowledge for effective prevention is uncertain and recommendations can change significantly over time and may even shift (Royal & Gray, 2020). Additionally, the long-term perspective must be considered crucial for assessing success of preventive actions (Pawellek et al., 2023). Moreover, the existence and usefulness of ECAP measures are less present in the general awareness and are mostly only insufficiently addressed in the counseling of parents by health professionals (Pawellek et al., 2023). Although the lowest *Access* values were consequently expected for mothers in the ECAP domain, the values for Access to information on ECAP proved generally similar as in the GH domain (Wirtz et al., 2022).

Research Aims

This study aims to examine and enhance the findings reported by Wirtz et al. (2022) on *Access* to health information by including the perspective of fathers and couples. The primary aim is to investigate whether and to what extent the respective partners report similar or divergent health literate *Access* abilities in the three health prevention domains.

> *Hypothesis 1* (*H1*): Within couples, maternal and paternal *Access* abilities correlate in all three domains GH, COVID-19-IP and ECAP due to the shared importance of health in parental couples (Feinberg 2002; Fisher et al., 2018).

> *Hypothesis 2* (*H2*): Mothers report higher abilities in health literate *Access* to information in all three domains GH, COVID-19-IP and ECAP than fathers due to general enhanced HL in women compared to men (Sørensen et al., 2015).

In addition, the investigation of potential interactions of gender with both the domains and the item content should help to identify gender-specific characteristics of *Access* to health information. The interaction of parental gender and domain refers to the question "Do *Access* differences between fathers and mothers vary between the domains GH, ECAP and COVID-19-IP?". For instance, mothers *Access* information on ECAP more actively. Consequently, they adopt stricter avoidance practices or follow current guidelines for early allergen introduction. Fathers may not be as familiar with such protocols, which could lead to tension or inconsistencies in caregiving within couples (Gaynor et al., 2024; Sarkadi et al., 2008). Because men are more likely to be vaccinated against COVID-19 but show lower adherence to public health measures (Jayawardana et al., 2024) it is suggested that corresponding gender differences also apply for accessing information.

> *Hypothesis 3* (*H3*): Differences between fathers and mothers in the *Access* to information depend on the health domains GH, ECAP and COVID-19-IP (i.e., two-way interaction of gender and domain).

> *Hypothesis 3a* (*H3a*): As mothers are more directly engaged in the care of the infants, a more health literate *Access* in the ECAP domain is expected.

The interaction of parental gender and *Access* items refers to the question "Are there varying differences between mothers and fathers depending on the single *Access* items?". For instance, mothers are generally more directly concerned with symptoms of illness and health indicators of the child than fathers, while the difference in information between the two genders regarding questions of professional health care is less pronounced (Baumann et al., 2020; Laws et al., 2019).

> *Hypothesis 4* (*H4*): Differences between fathers and mothers depend on the individual *Access* item contents (i.e., two-way interaction of gender and items).

> *Hypothesis 4a* (*H4a*): Differences between fathers and mothers in the specific *Access* item contents vary between domains (i.e., three-way interaction of gender, items, and domain). As mothers have more direct contact with the child, a particularly clear difference in health is expected in favor of women in the items on symptoms of illness (*Access* items 1–4).

Furthermore, it is assumed that the effects of the health domain demonstrated for mothers (Wirtz et al., 2022) are also evident for fathers.

> *Hypothesis 5* (*H5*): Due to the higher public presence and relevance of information on COVID-19-IP in times of the pandemic, *Access* to COVID-19 IP information is higher than *Access* to information on GH and ECAP, regardless of parents' gender (main effect of the domain, no interaction effect of domain and gender).

> *Hypothesis 6* (*H6*): Due to the rather uncertain evidence base and the low public presence of the ECAP topic, *Access* to ECAP information is lower than for information on GH.

Methods

The cross-sectional online data collection was conducted within a research project “Structural modelling and assessment of health literacy in allergy prevention of new parents” funded by the German Research Foundation [GZ: WI-3210/7-1]. It is one of the six projects of the DFG Research Group “Health Literacy in Early Childhood Allergy Prevention: Parental Competences and Public Health Context in a Changing Evidence Landscape” [HELICAP; FOR 2959; GZ: AP 235/3-1]. A positive ethical vote was given by the German Society of Psychology (registration number: MAW 112018).

Data Collection and Study Sample

The data were collected from May to August 2021. The survey was conducted online due to the COVID-19 pandemic. Participation in the study was promoted with the focus on the topic ECAP. Participants could decide whether to complete the questionnaire alone or within a digital video sessions supervised by project members. The comprehensive database was collected in three sessions of approximately 45 min each (interval between sessions: approximately 10 days). Survey time point 1: Sociodemographic, allergy-, and health-related characteristics (e.g., self-efficacy, risk competence); Survey time point 2: Items on GH and ECAP domain; Survey time point 3: Items on COVID-19-IP.

The survey design and recruitment of participants were conducted using the Tailored Design Method (Dillman et al., 2015). The 11 project staff members involved in the recruitment were trained to ensure standardized contact and support. Two hundred forty-eight women could be recruited to participate in the study. One hundred thirty-one male partners of these women also agreed to take part in the study. Three couples could not be matched, so that the data of N = 128 couples were included in the analysis (128 couples (mothers and fathers) of 248 mothers = 52.8%). Electronic Supplementary Material 1 (ESM 1) depicts the participants' flow chart. The n = 128 mothers for whom assignable data of the male partner were available did not differ from the excluded N = 120 mothers with regard to the age of the child and mother, socioeconomic status (SES), and the HL facets *Access* for GH, COVID-19-IP, and ECAP as well as Understand. In this respect, the assumption of a random selection or missing data process is suggested. To avoid refusing participation in the study to any interested mother, it was only strongly suggested that the male partners should also participate. However, the non-participation of the partner was not a reason for exclusion, so that data for fathers could only be collected for just over half of the participating women. Note, that the data of the 128 mothers are part of the analysis sample, which was used to analyze the dimensional structure of the three *Access* item groups (GH, COVID-19-IP, ECAP; Wirtz et al., 2022). Mothers' age was on average (M = 32.15; ESM 2) about 2 years below the age of their male partners (M = 34.12). With a mean value of 6.02 (mothers) and 6.15 (fathers) on the MacArthur scale, the SES of the sample is higher than in the German reference standard sample of women aged 18–44 years: M = 5.45, SD = 1.55 (Hoebel et al., 2015).

Measures

In the HLS-EU-Q47 (Sørensen et al., 2013), 47 items indicate the self-assessed HL for the four facets *Access*, *Understand*, *Appraise,* and *Apply*. In this study, only the 12 HLS-Q47 *Access* items were used. Each of the application areas *Health care*, *Disease prevention*, and *Health promotion* is assessed by four *Access* items. Additionally, the original items referring to *Access* to information on general health (GH) were adapted for the prevention domains COVID-19-IP and ECAP. The item adaptations were validated using cognitive interviews with N = 16 new parents. For COVID-19-IP, the adaptation was mainly realized by exchanging terms (e.g., disease → corona or corona infection; risk of disease → risk of infection). Moreover, it had to be taken into account that no COVID-19 vaccination was available, when the survey started (item 7). When formulating the ECAP items, it was crucial to consider that this was not about an acute illness or threat of illness, but that the primary preventive behavior relates to the long-term development of a health problem. Moreover, this health problem does not affect the health of the parents themselves, but the health of the child being cared for. Furthermore, no vaccinations for allergic diseases exist, so that this aspect is only indirectly relevant for prevention behavior (item 7) and political decisions are not directly linked to the prevention topic (item 11). The adapted item versions are documented in ESM 3.

In a sample of N = 343 (expectant) mothers of infants, the 12 *Access* items proved to be the main sources of variance (loadings of all items in each domain > .47) when analyzed using confirmatory bifactor models (Wirtz et al., 2022). The three-application areas *Health care*, *Disease prevention*, and *Health promotion* did not prove to be consistent sources of variance and contributed only marginally to the explanation of the item variance. Internal consistencies of the overall *Access* scale values proved to be good according to McDonald's ω: ω_{GH} = .874, $\omega_{COVID\text{-}19\text{-}IP}$ = .883, and ω_{ECAP} = .897. The validity of the *Access* score is further supported by positive correlations with social status according to the MacArthur scale and theory-consistent correlations with allergy burden and COVID-19 related characteristics.

Statistical Analysis

In the complete repeated measures 2 × 3 × 12-design, the main and interaction effects of gender (fixed effect), domain (fixed effect), and item content (random effects) are analyzed using repeated measures analysis of variance (ANOVA) (Eid et al., 2017). Within this analytical framework the sources of data variance are estimated, variance components that determine parents' responses in the *Access* items answered for the three domains GH, COVID-19-IP and ECAP. The sum-of-squares decomposition is used to determine the proportions of information that were systematically varied and crossed in the design. The underlying variance-analytical structural model is defined as follows:

$$x_{ijk} = I_i + G_j + D_k + (I \cdot G)_{ij} + (I \cdot D)_{ik} + (G \cdot D)_{jk} + (I \cdot G \cdot D)_{ijk} + e. \quad (1)$$

x_{ijk}: Response to the HLS-EU-Q47 *Access* item i from a parent of gender j for domain k.
I_i: Main effect of items (i = 1...12); variation due to item difficulty.
G_j: Main effect of gender (j = 1, 2); variation due to differences between mothers and fathers.
D_k: Main effect domain (k = 1, 2, 3); variation due to differences between domains GH, COVID-19-IP, and ECAP.
$(I \cdot G)_{ij}$: Interaction effect of items and gender; variation due to differences between mothers and fathers depending on the specific item contents.
$(I \cdot D)_{ik}$: Interaction effect of items and domain; variation due to differences between domains depending on the specific item contents.
$(G \cdot D)_{ik}$: Interaction effect of gender and domain; variation due to differences between mothers and fathers depending on the domains.
$(I \cdot G \cdot D)_{jk}$: Triple interaction effect of items, gender and domain; variation due to differences between mothers and fathers on the items depending on the domains.

Note that effects related to gender (main effect G_j; interaction effects $(I \cdot G)_{ij}$, $(G \cdot D)_{jk}$ and $(I \cdot G \cdot D)_{ijk}$ are examined in this study for the first time. In contrast, all gender-independent effects (main effect I_i and D_k; interaction effects $(I \cdot D)_{ik}$) represent effects that have already been demonstrated for (expectant) mothers: Both the main effects of the items and the domains (highest agreement values for COVID-19-IP) and the interaction effect of items and domain (highest agreement the two GH items values on support) proved to be significant. The present study thus investigates whether the gender-independent effects found for mothers can also be confirmed for fathers and mothers within couples.

To ensure a nominal a-level of .05 despite multiple testing, Bonferroni-adjusted a-value is used as significance threshold (Eid et al., 2017). For the 2 × 3 × 12-ANOVA a_{adjust} equals .05/7 = .007 since seven main- and interaction effects are tested. When testing effects at item level and the aggregated scale value, adjustments have to be made for 13 tests: a_{adj} = .05/13 = .004. To assess the strength of the effect size h^2, the following orientation values apply: h^2 = .01 small, h^2 = .06 medium and h^2 = .14 large. All descriptive analyses and ANOVAs as well as the examination of mean differences and correlations were computed with SPSS 28.

Results

A rather low association of health literate *Access* within the couples is indicated (H1 confirmed). At the level of the individual items, the correlations of the partners for GH are in the range r = .096–.315 (4 of the 12 correlations not significant) and for COVID-19-IP in the range r = .081–.180 (9 of the 12 correlations not significant). The correlations within the domain ECAP are highest for 10 of the 12 items: r = .169–.494 (p < .05 for all items). The correlation of the *Access* total score within the couples proved to be medium to high for ECAP with r = .440, medium for GH with r = .285 and rather weak for COVID-19-IP with r = .178.

The mean responses on the 12 *Access* items proved to be largely similar for fathers and mothers (Table 1). There is neither a main effect of gender (total score: $F_{\text{Gender}}(1, 127)$ = 2.77; p = .099; H2 rejected) nor an interaction effect of gender and domain (total score: $F_{\text{Domain}\times\text{Gender}}(2, 126)$ = 0.83; p = .869) (H3 rejected). Contrary to hypothesis 3a, mothers did not report higher *Access* values on the items regarding ECAP. Descriptively for fathers even higher values prevailed on 11 of the 12 ECAP items.

A significant but rather weak interaction effect of gender and items exists ($F_{\text{Items}\times\text{Gender}}(11, 1397)$ = 2.80; p = .003; H4 rejected): Contrary to H4 and H4a, this interaction is due to comparatively low agreement of mothers on items 5 ("support for unhealthy behavior") and 11 ("political/scientific changes") in each domain. Mothers did not show higher, descriptively even lower values on the items on health care (items 1–4; Table 2; H4a rejected).

Overall, the cross-domain difficulties of the items represent the strongest systematic source of variance ($F_{\text{Items}}(11, 254)$ = 128.667; p < .001; h^2_{part} = .503). *Access* to information on recommended vaccinations (item 7) and to health, promoting behaviors (item 9) is generally reported as the best. In contrast, *Access* to information on support for mental health (item 6) and political/scientific changes (item 11) is rated considerably lower.

Table 1. Results of the variance analytic significance testing and variance components of the 12 Access items, 2 genders and 3 domains (GH, COVID-19-IP, ECAP) and the according interaction effects

Sources of variance	SS	*df*	df_{GG}	df_{error}	MS	MS_{GG}	*F*	$p^{a)}$	$p_{GG}^{a)}$	h^2_{part}	h^2
Items	696.83	11	7.62	1,397	63.35	91.46	128.67	< .001	< .001	.503	.383
Gender	10.28	1	–	127	10.28	10.28	2.78	.099	.099	(.021)	(.006)
Domain	288.33	2	1.53	254	144.17	188.03	91.51	< .001	< .001	.419	.158
Items × Gender	10.15	11	8.75	1,397	0.92	1.16	2.80	< .001	.003	.022	.006
Items × Domain	157.83	22	16.79	2,794	7.15	9.40	24.43	< .001	< .001	.161	.087
Gender × Domain	0.19	2	1.51	254	0.10	0.13	0.08	.921	.869	(.001)	(.000)
Items × Domain × Gender	7.39	22	16.59	2,794	0.37	0.45	1.45	.082	.108	(.011)	(.004)
Error	649.28	2794	2,107.10		0.23	0.31					.357

Note. SS = Sum of squares; *df* = degrees of freedom; MS = Mean squares; GG = Greenhouse-Geisser corrected; *F* = ANOVA-test statistic; $h^2 = QS/QS_{total}$ = effect size eta square; h^2_{part} = effect size partial eta square; significance level = α = .05; Bonferroni-corrected for seven tests = α_{adjust} = .007.

Furthermore, the data structure is characterized by comparatively good *Access* to COVID-19-IP information for both fathers and mothers ($F_{Domain}(2, 254) = 91.51$; $p <$ .001; $h^2_{part} = .419$; H5 confirmed). The pairwise comparison shows a medium to high effect size for the COVID-19-IP *Access* total score in contrast to GH and ECAP: Cohen's $d_{mothers}$ = .627 (95% CI [.437–.816]) and .801 (95% CI [.601–.999]); Cohen's $d_{fathers}$ = .707 (95% CI [.512–.899]) and .594 (95% CI [.405–.781]). However, the differences between the domains are clearly reflected differently in the individual items ($F_{Domain \times Items}(22, 2,794) = 24.43$; $p <$ .001). The proportion of variance accounted for by the corresponding interaction effect is high at h^2_{part} = .161. The interaction is particularly evident in the fact that the values for *Access* to information on COVID-19-IP disease symptoms (item 1), as well as prevention (item 8: avoiding health risks; item 10: healthy living environment; item 12: health promotion offers) and treatment-related aspects (item 3: acting in medical emergencies, item 4: professional help) stand out markedly compared to those in the GH and ECAP domains. In contrast, for the items 5 and 6 on support highest *Access* values prevail in the GH domain.

The *Access* total score for ECAP is also significant, but weakly to moderately lower than for GH for mothers and fathers: Cohen's $d_{Mothers}$ = .318 (95% CI [.140–.495]); Cohen's $d_{Fathers}$ = .283 (95% CI [.106–.460]) (H6 confirmed). At the individual item level, *Access* to ECAP information is weaker across genders only for *Access* to information on support for unhealthy behavior (item 5: Cohen's $d_{Mothers}$ = .557 (95% CI [.370–.743]); Cohen's $d_{Fathers}$ = .601 (95% CI [.411–.788])), support for mental problems (item 6: Cohen's $d_{Mothers}$ = .438 (95% CI [.256–.619]); Cohen's $d_{Fathers}$ = .313 (95% CI [.135–.460])), and avoiding health risk (item 8: Cohen's $d_{Mothers}$ = .385 (95% CI [.205–.564]; Cohen's $d_{Fathers}$ = .391 (95% CI [.211–.570]).

The distinctive characteristics of *Access* to information in the COVID-19-IP domain are also evident in the correlations between the domains (last column in 23): For both mothers and fathers, the highest correlations between the GH and ECAP domains were found on all items and the *Access* total score (total score: $r_{GH,ECAP}$ = .749/.781; $r_{GH, COVID\text{-}19\text{-}IP}$= .496/.363; $r_{COVID\text{-}19,\ ECAP}$= .471/.314). *Access* to information on COVID-19 thus corresponds most weakly with the *Access* information in the other domains.

Discussion

In this cross-sectional survey, indicators of the HL facet *Access* to health information were analyzed within couples of parents of infants for the first time. Self-reported health literate *Access* to information on the two specific health topics COVID-19-IP and ECAP differed systematically from that collected by the original *Access* items (GH) of the HLS-EU-Q47. Thus, the established findings for mothers (Wirtz et al., 2022) regarding this strong domain effect and the interaction effect of domain and items could be confirmed for fathers and couples. For information on COVID-19-IP, fathers and mothers report the best health literate *Access* with mostly high effect sizes. Only for the two items on "support for unhealthy behavior" and "support for mental health problems" the highest values are reported for GH by fathers and mothers.

Generally, when assessing the HL Facet *Access* using a self-assessment such as the HLS-EU-Q47, it must be taken into account that, in addition to the individual's ability and skills to search for information, the accessibility, comprehensibility and usefulness of the information to be identified (World Health Organization, 2023) affect the reported data (Heiberger et al., 2023; Sørensen et al., 2013; Wirtz & Soellner, 2022). Accordingly, the comparatively high ability to *Access* information on COVID-19-IP seems reasonable, as at the time of the survey in 2022, protection against COVID-19 infections was an issue affecting parents everyday lives considerably (Mach et al., 2021; Saladino et al., 2020; Spring, 2020; Wirtz et al., 2022). If measures to improve public awareness of and protection

Table 2. Descriptive values of the HLS-EU-Q47 *Access* items for the N = 128 mothers and fathers and results of the 12 × 2 × 3-ANOVA with repeated measurements

		$HLSEU_{Access}$				ANOVA			
						Domain	Gender	Domain × Gender	Correlations
Find information about …	Parental role	GH	COVID-19	ECAP		df = 2,254	df = 1,127	df = 2,254	Mothers | Fathers
Health care									
1. Disease symptoms	Mothers	2.91 (0.640)	3.68 (0.501)	2.89 (0.630)	F_{ANOVA}	191.17	0.000	2.24[b)]	$r_{GH,C}$ = .208*[,a)] | .021
	Fathers	2.83 (0.616)	3.67 (0.471)	2.98 (0.602)	p	< .001	1.000	.112	$r_{GH,ECAP}$ =.425*** |.354***
		$r_{M,F}$ = .162	$r_{M,F}$ = .085	$r_{M,F}$ = .182"[,a)]	h^2_{part}	.370	(.000)	(.017)	$r_{C,ECAP}$ = .312*** | .176*[,a)]
2. Therapies for diseases	Mothers	2.69 (0.696)	2.91 (0.794)	2.68 (0.731)	F_{ANOVA}	13.23[b)]	1.28	0.06[b)]	$r_{GH,C}$ = .364*** | .154
	Fathers	2.74 (0.565)	3.00 (0.813)	2.91 (0.794)	p	< .001	.242	.922	$r_{GH,ECAP}$ = .343*** | .471***
		$r_{M,F}$ = .234**[,a)]	$r_{M,F}$ = .146	$r_{M,F}$ = .215*[a)]	h^2_{part}	.094	(.011)	(.001)	$r_{C,ECAP}$ = .319*** | .191*[,a)]
3. Acting in medical emergencies	Mothers	2.90 (0.708)	3.27 (0.715)	2.72 (0.793)	F_{ANOVA}	60.08[b)]	1.96	1.47[a)]	$r_{GH,C}$ = .256** | .189*[,a)]
	Fathers	2.90 (0.662)	3.42 (0.659)	2.80 (0.743)	p	< .001	.164	.231	$r_{GH,ECAP}$ = .594*** | .664***
		$r_{M,F}$ = .213*[,a)]	$r_{M,F}$ = .178*[,a)]	$r_{M,F}$ = .307***	h^2_{part}	.321	(.015)	(.011)	$r_{C,ECAP}$ = .244**[,a)] | .153
4. Professional help	Mothers	2.95 (0.756)	3.27 (0.758)	2.79 (0.780)	F_{ANOVA}	31.75[b)]	1.23	0.36[b)]	$r_{GH,C}$ = .314*** | .205*[,a)]
	Fathers	2.99 (0.726)	3.30 (0.757)	2.90 (0.762)	p	< .001	.269	.666	$r_{GH,ECAP}$ = .554*** | .611**
		$r_{M,F}$ = .286**	$r_{M,F}$ = .081	$r_{M,F}$ = .494***	h^2_{part}	.200	(.010)	(.003)	$r_{C,ECAP}$ = .322*** | .244**[,a)]
Disease prevention									
5. Support for unhealthy behavior	Mothers	3.01 (0.715)	2.80 (0.797)	2.52 (0,721)	F_{ANOVA}	33.98	6.56	1.07[b)]	$r_{GH,C}$ = .160 | .232**[,a)]
	Fathers	3.09 (0.669)	3.02 (0.798)	2.62 (0.665)	p	< .001	.012[a)]	.341	$r_{GH,ECAP}$ = .267** | .293***
		$r_{M,F}$ = .146	$r_{M,F}$ = .131	$r_{M,F}$ = .399***	h^2_{part}	.211	(.049)	(.008)	$r_{C,ECAP}$ = .118 | .269**
6. Support for mental problems	Mothers	2.56 (0.761)	2.40 (0.817)	2.24 (0.750)	F_{ANOVA}	10.93[b)]	1.41	0.47	$r_{GH,C}$ = .219*[,a)] | .364***
	Fathers	2.59 (0.747)	2.45 (0.841)	2.37 (0.730)	p	< .001	.237	.615	$r_{GH,ECAP}$ = .532*** | .521***
		$r_{M,F}$ = .253**[,a)]	$r_{M,F}$ = .171	$r_{M,F}$ = .411**	h^2_{part}	.079	(.011)	(.004)	$r_{C,ECAP}$ = .317*** | .304***
7. Recommended vaccinations	Mothers	3.17 (0.665)	3.34 (0.724)	3.11 (0.853)	F_{ANOVA}	10.89	0.15	1.02[b)]	$r_{GH,C}$ = .162 | .334***
	Fathers	3.12 (0.671)	3.38 (0.711)	3.19 (0.637)	p	< .001	.699	.357	$r_{GH,ECAP}$ = .605*** | .482***
		$r_{M,F}$ = .096	$r_{M,F}$ = .161	$r_{M,F}$ = .179*[,a)]	h^2_{part}	.079	(.001)	(.008)	$r_{C,ECAP}$ = .310*** | .275**
8. Avoiding health risks	Mothers	2.92 (0.728)	3.57 (0.598)	2.61 (0.734)	F_{ANOVA}	137.19	0.13	1.29	$r_{GH,C}$ = .302*** | .211*[a)]
	Fathers	2.95 (0.713)	3.46 (0.587)	2.64 (0.696)	p	< .001	.722	.278	$r_{GH,ECAP}$ = .385*** | .388***
		$r_{M,F}$ = .189*[,a)]	$r_{M,F}$ = .142	$r_{M,F}$ = .216*[,a)]	h^2_{part}	.519	(.001)	(.010)	$r_{C,ECAP}$ = .063 | .100
Health promotion									
9. Health promoting behaviors	Mothers	3.12 (0.687)	3.19 (0.801)	2.98 (0.676)	F_{ANOVA}	13.89[b)]	0.01	1.09[b)]	$r_{GH,C}$ = .215*[,a)] | .268**
	Fathers	3.09 (0.640)	3.27 (0.693)	2.93 (0.630)	p	< .001	.920	.332	$r_{GH,ECAP}$ = .513*** | .484***
		$r_{M,F}$ = .262**	$r_{M,F}$ = .108	$r_{M,F}$ = .294***	h^2_{part}	.099	(.000)	(.009)	$r_{C,ECAP}$ = .296*** | .206*[,a)]
10. Healthy living environment	Mothers	2.45 (0.708)	2.86 (0.839)	2.50 (0.721)	F_{ANOVA}	25.20[b)]	1.80	0.61[b)]	$r_{GH,C}$ = .279*** | .182*[,a)]
	Fathers	2.55 (0.662)	2.88 (0.842)	2.62 (0.733)	p	< .001	.182	.503	$r_{GH,ECAP}$ = .687*** | .620***
		$r_{M,F}$ = .208*[,a)]	$r_{M,F}$ = .176*[,a)]	$r_{M,F}$ = .231**[,a)]	h^2_{part}	.166	(.014)	(.005)	$r_{C,ECAP}$ = .234**[,a)] | .266*
11. Political/scientific changes	Mothers	1.92 (0.694)	2.50 (0.832)	2.21 (0.648)	F_{ANOVA}	32.83[b)]	15.44	2.00[b)]	$r_{GH,C}$ = .327*** | .269**
	Fathers	2.27 (0.750)	2.69 (0.894)	2.38 (0.700)	p	< .001	< .001	.142	$r_{GH,ECAP}$ = .335*** | .429***
		$r_{M,F}$ = .208*[,a)]	$r_{M,F}$ = .148	$r_{M,F}$ = .376***	h^2_{part}	.205	(.108)	(.015)	$r_{C,ECAP}$ = .314*** | .193*[,a)]

(Continued on next page)

Table 2. (Continued)

Find information about ...	Parental role	HLSEU$_{Access}$ GH	HLSEU$_{Access}$ COVID-19	HLSEU$_{Access}$ ECAP		ANOVA Domain df = 2,254	ANOVA Gender df = 1,127	ANOVA Domain × Gender df = 2,254	Correlations Mothers | Fathers
12. Health promotion offers	Mothers	2.41 (0.716)	2.98 (0.764)	2.45 (0.850)	F_{ANOVA}	46.79$^{b)}$	1.13	1.03$^{b)}$	$r_{GH,C}$ = .335*** | .283**
	Fathers	2.56 (0.811)	3.01 (0.837)	2.48 (0.710)	p	< .001	.290	.355	$r_{GH,ECAP}$ = .582*** | .467***
		$r_{M,F}$ = .315***	$r_{M,F}$ = .180*$^{, a)}$	$r_{M,F}$ = .273**	h^2_{part}	.269	(.009)	(.008)	$r_{C,ECAP}$ = .306*** | .206*$^{,a)}$
Total score	Mothers	2.75 (0.462)	3.06 (0.522)	2.64 (0.498)	F_{ANOVA}	91.51$^{b)}$	2.77	0.83$^{b)}$	$r_{GH,C}$ = .496*** | .363**
	Fathers	2.81 (0.445)	3.13 (0.510)	2.72 (0.475)	p	< .001	.099	.869	$r_{GH,ECAP}$ = .749*** | .781***
		$r_{M,F}$ = .285***	$r_{M,F}$ = .178*$^{, a)}$	$r_{M,F}$= .440**	h^2_{part}	.419	(.021)	(.001)	$r_{C,ECAP}$ = .471*** | .314*
Cronbach's α (Mothers| Fathers)		.878 | .872	.902 |.894	.880 | .899					
McDonalds ω (Mothers| Fathers)		.873 |.871	.891|.890	.877 | .885					
$r_{it,c}$									
Mothers		[.390–.648]	[.463–.739]	[.493–.698]					
Fathers		[.408–.680]	[328.–.747]	[.440–.721]					

Note. GH = General health; IP = Infection prevention; ECAP = early childhood allergy prevention; DOM = Domain; GEN = Gender; M = Mothers; F = Fathers; $r_{c,it}$ = corrected item-total-correlation; F_{ANOVA} = F-test-statistics (Analysis of variance); GG = Greenhouse-Geisser-corrected values. *p < .05; **p < .01; ***p < .001; $^{a)}$ not significant after Boferroni-correction for N = 13 tests: α_{adjust} = .004; $^{b)}$Sphericity assumption violated according to Mauchly W-test.

against COVID-19 infections are understood as global or societal uncontrolled public health intervention, our findings may be interpreted to indicate the effectiveness of these measures with regard to the HL facet *Access*. However, because of the cross-sectional, descriptive study design our study findings are not sufficient to prove specific determinants and processes affecting parents' health literate *Access* in a causal manner. Accordingly, future research should further clarify how (i) the individual level of information processing (i.e., access competence; Wirtz & Soellner, 2022) and (ii) the level of information (esp. availability, conception, organization) selectively and interactively affect HL in different health domains and generally determine health behavior. The central challenge here should be to find the optimal match between individual skills and the information offered to the target group. While the information components of the *Access* indicators were examined at the diagnostic level in the present study, intervention-oriented studies should consolidate this knowledge and use it for well-founded promotion of HL.

Furthermore, it should be noted that information on COVID-19-IP tends to relate to more specific measures compared to GH and ECAP. Because respondents can conceptualize the measures (e.g., wearing a mask, physical distancing, adhering to hygiene rules) more concretely and the effects are more specifically defined (in particular avoiding acute infection), *Access* to the corresponding helpful information may also appear less problematic (Pieper et al., 2015).

Access to ECAP information is reported to be more difficult than for information regarding GH. This is consistent with ECAP playing a rather subordinate role in providing health-related information to parents of newborns (Ferrante et al., 2020) and being characterized by higher uncertainty regarding the evidence (Royal & Gray, 2020). Nevertheless, *Access* differences between these two domains are rather weak at the level of the *Access* total-score and even not evident for most of the individual items. This could also be due to parents being more concerned with health information because of the demanding task of caring for the newborn's health. The decisive factor for the not markedly lower ECAP-related *Access* scores would therefore be special efforts by parents of newborns to learn about child health issues.

This consideration is further supported because *Access* values within the parent couples are most strongly correlated for the ECAP domain. Caring for a child's health is generally a new field of experience and learning for parents of newborns. Parents should face this challenge together as a couple (deMontigny et al., 2018): Fathers and mothers may inform together as couples about childcare issues and decide and act in a more harmonized manner than in other health domains. Thus, learning and experience gains may be more similar in this domain for both and thus might lead to enhanced correlations of ECAP-related *Access* literacy within couples. In contrast to the ECAP domain, the low correlations of the *Access* values with regard to GH and COVID-19 suggest that health literate *Access* should be assumed to be a characteristic of the individual partners rather than a characteristic of the couple. In order to substantiate this assumption, however, longitudinal studies or a comparison with adults without experience in the area of healthcare for children would be informative.

Although specific barriers to active participation and thus information *Access* in the antenatal and postnatal period have been postulated for fathers of newborns (Wynter et al., 2023), no interaction effect of gender and domain prevails. Such an interaction effect should result if specifically for the child-related prevention topic ECAP lower *Access* values for fathers were measured. In future research, it would be valuable to investigate whether and in which specific areas of childcare *Access* to helpful information is specifically more difficult for fathers and how they cope with these difficulties (Atkinson et al., 2021; Laws et al., 2019; Moura & Philippe, 2023).

Limitations of the Study

The HLS-EU-Q47 is a self-assessment that defines HL and its facets as subjectively represented knowledge and experience based abilities and skills. Generally, self-reports may be deliberately influenced by response sets (e.g., self-serving bias, social desirability, consistency effects (e.g., halo effect), acquiescence; Dufner et al., 2019). To gain a better empirical understanding of problems in the operationalization of HL by means of self-assessments in the HLS-EU (Zell & Krizan, 2014), supplementary objective performance assessments based on the psychometric standards of the psychological competence definition (Wirtz & Söllner, 2022) and measurement of the HL-facet *Access* should be established. Moreover, the focus on allergy and COVID-19 prevention in the research project could have influenced parents' sensitivity to the topics (availability heuristic). Only about half of the male partners of the women participating in the study agreed to take part in the study. It is likely that fathers who attach greater importance to the topic of active health care for the newborn and consider this being an essential joint partnership obligation were more likely to participate. Furthermore, mothers and fathers had a higher social status than the general population. In general, it must be recognized that the self-image and parental role of fathers in particular in childcare is significantly influenced by social and cultural characteristics. Accordingly, it would be beneficial to study parental HL in populations from different countries and with different socioeconomic backgrounds (Diniz et al., 2021). Any possible limitations to representativeness and generalizability associated with this must be considered when interpreting the results. Although the sample size of $N = 128$ couples allows an adequate data basis for the variance-analytical mean comparisons and the correlations (Eid et al., 2017), a larger sample would have been desirable to apply the same psychometric methods used by Wirtz et al. (2022) for mothers. Due to the comprehensive overall assessment, the data on COVID-19-IP were collected approximately 10 days later than the data on GH and ECAP. The coherence of the data on GH and ECAP could be increased due to measurement time point-specific biasing effects in contrast to the COVID-19-IP-related data. In this study, *Access* as only one of the four subfacets of HL (Sørensen et al., 2013) was investigated. This was intended to provide a factorial and construct-valid diagnostic approach to HL on the basis of cognitive-psychological models for distinct sub-processes of information processing (Heiberger et al., 2023; Wirtz & Soellner, 2022). In future, it would be important not only to focus on the first phase of HL-related information processing *Access*, but also to empirically analyze associations with the subsequent phases of *Understand*, *Appraise*, and *Apply*.

In summary, the research approach chosen in this study might allow to enrich research on HL in general. Firstly, we analyzed parent couples data integratively. In view of demands to strengthen fathers in child care (Diniz et al., 2021; Jansen et al., 2024; Moura & Philippe, 2023) and the importance of parental couples as child care dyads (Serbin et al., 2014), this study provides an exemplary contribution to bringing partnership aspects into the focus of HL research. That mothers and fathers have similar average *Access* values in the respective domains and nevertheless the *Access* values only correlate substantially in the ECAP domain within the couple's offers promising starting points for a more targeted analysis and development of HL in parent couples. Secondly, we focused on a specific life situation, in which parents have to cope with new and demanding challenges regarding their HL. Targeting and comparatively analyzing specific life situations or health domains can contribute to a better understanding of the characteristics and significance of HL in specific life contexts. Thirdly, the domain dependence of the self-reported HL-Facet *Access* contrasts with the findings for the HL-facet Understand, which was measured using a performance test (Schulz et al., 2022). Health-literate understanding of information proved to be domain-independent or generic as GH, COVID-19-IP and ECAP items were found to be homogeneous indicators of a common latent trait. Thus, differentiated analysis of various HL facets, operationalisations (esp. self-assessments vs. performance tests) and HL development trajectories may lead to a deeper understanding of both the characteristics of the multidimensional construct

HL as well as the skills and abilities of specific populations in health prevention. This should provide important information about what characterizes parental HL in childcare, how HL develops in this sensitive phase of life and how HL of parent couples can be supported to provide the best possible health care for their child.

Electronic Supplementary Materials

The following electronic supplementary material is available with this article at https://doi.org/10.1027/2512-8442/a000172

ESM 1. Sociodemographic characteristics of the study sample.

ESM 2. Flow of the collection of couple data.

ESM 3. Item formulations of the three variants of the access items for GH, COVID-19-IP, and ECAP.

References

Aarthun, A., & Akerjordet, K. (2014). Parent participation in decision-making in health-care services for children: An integrative review. *Journal of Nursing Management, 22*(2), 177–191. https://doi.org/10.1111/j.1365-2834.2012.01457.x

Aborigo, R. A., Reidpath, D. D., Oduro, A. R., & Allotey, P. (2018). Male involvement in maternal health: perspectives of opinion leaders. *BMC Pregnancy and Childbirth, 18*, Article 3. https://doi.org/10.1186/s12884-017-1641-9

Abuhaloob, L., Purnat, T. D., Tabche, C., Atwan, Z., Dubois, E., & Rawaf, S. (2024). Management of infodemics in outbreaks or health crises: a systematic review. *Frontiers Public Health, 12*, Article 1343902. https://doi.org/10.3389/fpubh.2024.1343902

Atkinson, L., Silverio, S. A., Bick, D., & Fallon, V. (2021). Relationships between paternal attitudes, paternal involvement, and infant-feeding outcomes: Mixed-methods findings from a global on-line survey of English-speaking fathers. *Maternal Child Nutrition, 17*(Suppl 1), Article e13147. https://doi.org/10.1111/mcn.13147

Baumann, I., Jaks, R., Robin, D., Juvalta, S., & Dratva, J. (2020). Parents' health information seeking behaviour–does the child's health status play a role? *BMC Family Practice, 21*, Article 266. https://doi.org/10.1186/s12875-020-01342-3

de Buhr, E., & Tannen, A. (2020). Parental health literacy and health knowledge, behaviours and outcomes in children: a cross-sectional survey. *BMC Public Health, 20*(1), Article 1096. https://doi.org/10.1186/s12889-020-08881-5

deMontigny, F., Gervais, C., Larivière-Bastien, D., & St-Arneault, K. (2018). The role of fathers during breastfeeding. *Midwifery, 58*, 6–12. https://doi.org/10.1016/j.midw.2017.12.001

Dillman, D. A., Smyth, J. D., & Christian, L. M. (2015). *Internet, phone, mail, and mixed-mode surveys: The tailored design method*. Wiley.

Diniz, E., Brandao, T., Montiro, L., & Verissimo, M. (2021). Father involvement during early childhood: A systematic review of the literature. *Journal of Family Theory & Review, 13*(1), 77–99. https://doi.org/10.1111/jftr.12410

Dufner, M., Gebauer, J. E., Sedikides, C., & Denissen, J. J. A. (2019). Self-Enhancement and Psychological Adjustment: A Meta-Analytic Review. *Personality and Social Psychological Review, 23*(1), 48–72. https://doi.org/10.1177/1088868318756467

Eid, M., Gollwitzer, M., & Schmitt, M. (2017). *Statistik und Forschungsmethoden* [Statistics and Research Methods]. Beltz.

Feinberg, M. E. (2002). Coparenting and the transition to parenthood: a framework for prevention. *Clinic Child and Family Psychology Review, 5*(3), 173–195. https://doi.org/10.1023/a:1019695015110

Ferrante, G., Carta, M., Montante, C., Notarbartolo, V., Corsello, G., & Giuffrè, M. (2020). Current insights on early life nutrition and prevention of allergy. *Frontiers in Pediatrics, 8*, Article 448. https://doi.org/10.3389/fped.2020.00448

Fisher, D., Khashu, M., Adama, E. A., Feeley, N., Garfield, G. F., Ireland, J., et al. (2018). Fathers in neonatal units: Improving infant health by supporting the baby-father bond and mother-father coparenting. *Journal of Neonatal Nursing, 24*(6), 306–312. https://doi.org/10.1016/j.jnn.2018.08.007

Gaynor, M., Wynter, K., Hesketh, K. D., Love, P., & Laws, R. (2024). Fathers' perceived role, self-efficacy and support needs in promoting positive nutrition and physical activity in the first 2000 days of life: a mixed methods study. *International Journal of Behavioral Nutrition and Physical Activity, 21*, Article 23. https://doi.org/10.1186/s12966-024-01575-w

Harrison, C. (2004). Treatment decisions regarding infants, children and adolescents. *Paediatrics & Child Health, 9*(2), 99–103. https://doi.org/10.1093/pch/9.2.99

Heiberger, A., Dresch, C., Schulz, A., & Wirtz, M. A. (2023). Health literate internet-based information-seeking processes: Theory-based development of a conceptual model. *Journal of Medical Internet Research, 25*, Article e39024. https://doi.org/10.2196/39024

Hoebel, J., Müters, S., Kuntz, B., Lange, C., & Lampert, T. (2015). Messung des subjektiven sozialen Status in der Gesundheitsforschung mit einer deutschen Version der MacArthur Scale [Measuring subjective social status in health research with a German version of the MacArthur Scale]. *Bundesgesundheitsblatt, 58*, 749–757. https://doi.org/10.1007/s00103-015-2166-x

Jansen, E., Marceau, K., Sellers, R., Chen, T., Garfield, C. F., Leve, L. D., Niederhieser, J. M., Spotts, E. L., & Roary, M. (2024). The role of fathers in child development from preconception to postnatal influences. *Developmental Psychobiology, 66*(2), Article e22451. https://doi.org/10.1002/dev.22451

Jayawardana, S., Esquivel, M., Orešković, T., & Mossialos, E. (2024). Gender differences in COVID-19 preventative measures and vaccination rates in the United States: A longitudinal survey analysis. *Vaccine, 32*(23), Article 126044. https://doi.org/10.1016/j.vaccine.2024.06.012

Laws, R., Walsh, A. D, Hesketh, K. D., Downing, K. L., Kuswara, K., & Campbell, K. J. (2019). Differences between mothers and fathers of young children in their use of the internet to support healthy family lifestyle behaviors: Cross-sectional study. *Journal of Medical Internet Research, 21*(1), Article e11454. https://doi.org/10.2196/11454

Liu, C., Wang, D., Liu, C., Jiang, J., Wang, X., Chen, H., Ju, X., & Zhang, X. (2020). What is the meaning of health literacy? A systematic review and qualitative synthesis. *Family Medicine & Community Health, 8*(2), Article e000351. https://doi.org/10.1136/fmch-2020-000351

Mach, K. J., Salas Reyes, R., Pentz, B., Taylor, J., Costa, C. A., Cruz, S. G., Thomas, K. E., Arnott, J. C., Donald, R., Jagannathan, Kirchhoff, C. J., Rosella, L. C., & Klenk, N. (2021). News media coverage of COVID-19 public health and policy information. *Humanities and Social Sciences Communications, 8*, Article 220. https://doi.org/10.1057/s41599-021-00900-z

Moura, A. F., & Philippe, K. (2023). Where is the father? Challenges and solutions to the inclusion of fathers in child feeding and nutrition research. *BMC Public Health, 23*(1), Article 1183. https://doi.org/10.1186/s12889-023-15804-7

Pawellek, M., Köninger, A., Melter, M., Kabesch, M., Apfelbacher, C., & Brandstetter, S. (2023). KUNO-Kids study group. Early childhood allergy prevention behaviors: Trends in Germany from 2015 to 2020. *Pediatric Allergy and Immunology, 34*(4), Article e13948. https://doi.org/10.1111/pai.13948

Pieper, D., Jülich, F., Antoine, S. L., Antoine, S. L., Bächle, C., Chernyak, N., Genz, J., Eikermann, M., & Icks, A. (2015). Studies analysing the need for health-related information in Germany – A systematic review. *BMC Health Services Research, 15*, Article 407. https://doi.org/10.1186/s12913-015-1076-9

Roberts, G., Bahnson, H. T., Du Toit, G., O'Rourke, C., Sever, M. L., Brittain, E., Plaut, M., & Lack, G. (2023). Defining the window of opportunity and target populations to prevent peanut allergy. *Journal of Allergy and Clinical Immunology, 151*(5), 1329–1336. https://doi.org/10.1016/j.jaci.2022.09.042

Royal, C., & Gray, C. (2020). Allergy prevention: An overview of current evidence. *Yale Journal of Biological Medicine, 93*(5), 689–698.

Sakardi, A., Kristiansson, R., Oberkalid, F. & Bremberg, S. (2008). Fathers' involvement and children's developmental outcomes: a systematic review of longitudinal studies. *Acta Paediatrica*, *97*, 153-158. https://doi.org/10.1111/j.1651-2227.2007.00572.x

Saladino, V., Algeri, D., & Auriemma, V. (2020). The psychological and social impact of Covid-19: New perspectives of well-being. *Frontiers in Psychology, 11*, Article 577684. https://doi.org/10.3389/fpsyg.2020.577684

Schulz, A. A., Dresch, C., Heiberger, A., & Wirtz, M. A. (2022). Use of item response models in assessing the health literacy facet understanding health information for early childhood allergy prevention and prevention of COVID-19 infections by pregnant women and mothers of Infants. *Diagnostica, 68*(4), 172–183. https://doi.org/10.1026/0012-1924/a000298

Serbin, L. A., Hubert, M., Hastings, P. D., Stack, D. M., & Schwartzman, A. E. (2014). The influence of parenting on early childhood health and health care utilization. *Journal of Pediatric Psychology, 39*(10), 1161–1174. https://doi.org/10.1093/jpepsy/jsu050

Sørensen, K., van den Broucke, S., Pelikan, J. M., Fullam, J., Doyle, G., Slonska, Z., Kondilis, B., Stoffels, V., Osborne, R. H., & Brand, H. (2013). Measuring health literacy in populations: Illuminating the design and development process of the European Health Literacy Survey Questionnaire (HLS-EU-Q). *BMC Public Health, 13*(1), Article 948. https://doi.org/10.1186/1471-2458-13-948

Sørensen, K., Pelikan, J. M., Röthlin, F., Ganahl, K., Slonska, Z., Doyle, G., Fullam, J., Kondilis, B., Agrafiotis, D., Uiters, E., Falcon, M., Mensing, M., Tchamov, K., van den Broucke, S., & Brand, H. (2015). Health literacy in Europe: comparative results of the European health literacy survey (HLS-EU). *European Journal of Public Health, 25*(6), 1053–1058. https://doi.org/10.1093/eurpub/ckv043

Spring, H. (2020). Health literacy and COVID-19. *Health Information and Libraries Journal, 37*(3), 171–172. https://doi.org/10.1111/hir.12322

Tokhi, M., Comrie-Thomson, L., Davis, J., Portela, A., Chersich, M., & Luchters, S. (2018). Involving men to improve maternal and newborn health: a systematic review of the effectiveness of interventions. *PLoS One, 13*, Article e0191620. https://doi.org/10.1371/journal.pone.0191620

Urman, G., Avilez Díaz, S., Urman, J., & Grosman, A. (2025). Parents' use of the Internet and social media as a source of information on health and parenting. *Archivos Argentinos de Pediatria, 123*(1), Article e202410451. https://doi.org/10.5546/aap.2024-10451.eng

Wells, M. B. (2016). Literature review shows that fathers are still not receiving the support they want and need from Swedish child health professionals. *Acta Paediatrica, 105*, 1014–1023. https://doi.org/10.1111/apa.13501

Wirtz, M. A., Heiberger, A., Dresch, C., & Schulz, A. A. (2022). Structural analysis of the health literacy facet access to information on general health, COVID-19 infection prevention, and early childhood allergy prevention in pregnant women and mothers of infants. *Diagnostica, 68*(4), 219–230. https://doi.org/10.1026/0012-1924/a000295

Wirtz, M. A., & Soellner, R. (2022). Gesundheitskompetenz. Konstruktverständnis und Anforderungen an valide Assessments aus Perspektive der psychologischen Diagnostik [Health Literacy – Construct definition and requirements for valid assessments from the perspective of psychological diagnostics]. *Diagnostica, 68*(4), 163–171. https://doi.org/10.1026/0012-1924/a000299

World Health Organization. (2023). *Advice for the public*: *Coronavirus disease* (*COVID-19*). WHO. https://www.who.int/emergencies/diseases/novel-coronavirus-2019/advice-for-public

Wynter, K., Watkins, V., Kavanagh, S., Hosking, S., Rasmussen, B., Maindal, H. T., & Macdonald, J. (2023). Health literacy among fathers and fathers-to-be: a multi-country, cross-sectional survey. *Health Promotion International, 38*(5), Article daad131. https://doi.org/10.1093/heapro/daad131

Yogman, M., & Eppel, A. M. (2022). The role of fathers in child and family health. In M. Grau, M. las Heras Maestro, & H. R. Bowles (Eds.), *Engaged fatherhood for men, families and gender equality. Contributions to management science* (pp. 15–30). Springer. https://doi.org/10.1007/978-3-030-75645-1_2

Zell, E., & Krizan, Z. (2014). Do people have insight into their abilities? A metasynthesis. *Perspectives on Psychological Science, 9*(2), 111–125. https://doi.org/10.1177/1745691613518075

History
Received January 10, 2024
Revision received October 6, 2024
Accepted December 3, 2024
Published online March 10, 2025

Acknowledgments
An earlier version of the study findings were presented at the 37th Annual Conference of the European Health Psychology Society (Bremen, Germany, September 2023).
This study was conducted within the interdisciplinary research group HELICAP (Health Literacy in Early Childhood Allergy Prevention; https://www.helicap.org), located at Otto von Guericke University Magdeburg, University of Education Freiburg, University of Regensburg and Hanover Medical School (Steering committee members: Christian Apfelbacher, Eva Maria Bitzer, Susanne Brandstetter, Janina Curbach, Marie-Luise Dierks, Markus Antonius Wirtz).
We would like to thank the parents who supported our study with their dedicated participation. We thank Dr. Carolin Dresch und Andrea Heiberger for their contribution to data collection.

Conflict of Interest
Anja A. Schulz and Markus A. Wirtz declare to have no competing interests.

Publication Ethics
The Ethics Statement was approved by Ethics Committee of the German Psychological Society (https://www.dgps.de/serviceangebote/ethikkommission/; registration number MAW 112018). Informed consent has been obtained for all participants. The study was performed in accordance with the ethical principals in the Declaration of Helsinki.

Authorship
Anja A. Schulz, Markus A. Wirtz, data collection, interpretation – results; Markus A. Wirtz, data analyses, manuscript – draft; Anja A. Schulz, manuscript – reading, final approval.

Open Science
The datasets created and analyzed as part of the current study are not available publicly but can be obtained from the authors (anja.schulz@ph-freiburg.de) upon reasonable request. The data are not made freely available to the public, as this was not explicitly requested in the ethics application.

Funding
This study was funded by the German Research Foundation (DFG; Deutsche Forschungsgemeinschaft; DFG research group “Health Literacy in Early Childhood Allergy Prevention: Parental Competencies and Public Health Context in a Shifting Evidence Landscape” [FOR 2959; G.Z.: AP 235/3 – 1; project number: 409800133]. The study was conducted as part of the HELICAP-subproject “Structural Modelling and Assessment of Health Literacy in Allergy Prevention of New Parents” [G.Z.: WI-3210/7-1]. Open access publication enabled by University of Education Freiburg, Germany.

ORCID
Markus A. Wirtz
https://orcid.org/0000-0002-9392-0484
Anja A. Schulz
https://orcid.org/0000-0002-9591-5689

Markus Antonius Wirtz
Department of Research Methods
University of Education Freiburg
Kunzenweg 21
79117 Freiburg i.Br.
Germany
markus.wirtz@ph-freiburg.de