

Decision-Making Ability: A Missing Link Between Health Literacy, Contextual Factors, and Health

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ABSTRACT

Background: Health literacy has often been described as an important precondition for good health decisions, healthy behaviors, and health. However, reviews reveal low evidence for intervention effectiveness through health literacy. This result calls for more investigations to be done in the pathway from health literacy to health, considering intermediate outcomes of health literacy. **Objective:** This study explores an important immediate objective of health literacy, namely the decision-making ability (DMA) regarding health issues. The study's hypothesis claims the DMA to be an important mediator between health literacy and health outcomes. Furthermore, the study assumes that the effect of the DMA on different health outcomes is not only contingent on health literacy but also on contextual factors. To test the above hypotheses, six different health literacy dimensions and four health outcomes have been analyzed. **Methods:** Cross-sectional data from the Young Adult Survey Switzerland was used for mediation analyses ($N = 4,569$, age, 18 to 25 years, all male). Multiple regression and KHB (Karlson, Holm, and Breen) decomposition analyses were applied to estimate mediation effects between health literacy and health outcomes. **Key Results:** Five of six health literacy dimensions explained the DMA in a linear regression model. The coefficients of the DMA explaining health outcomes were substantially reduced when health literacy items were included into the models (6.1%–20.3%). Furthermore, the associations between health literacy and the health outcomes were fully explained by contextual factors, except in the mental health model. **Conclusions:** The results support the hypothesis that higher health literacy levels do not necessarily lead to better health directly. Rather, health literacy is just one of multiple factors contributing to a higher DMA and, further, to favorable health outcomes. The results of this study call for more investigations in the health decision-making process and the role of contextual factors. [HLRP: *Health Literacy Research and Practice*. 2022;6(3):e213–e223.]

Plain Language Summary: The study investigated the ability to make good health decisions while considering health literacy. The results support the intermediate function of the decision-making ability on the path to favorable health outcomes. Furthermore, it is found that the DMA as well as health literacy are highly contingent on contextual factors. The results shed light into the complex decision-making process regarding health issues.

Since population surveys had found a high prevalence of low health literacy (Kutner et al., 2006; Sørensen et al., 2015), the concept of health literacy has gained increased attention in public health and health promotion. Low health literacy appeared to be a proximate cause of poor health outcomes, poor adherence to medical advice, and increased health system utilization (Bennett et al., 2009; Berkman et al., 2011; Pelikan et al., 2012). In contrast to more distant structural causes of health, such as socioeconomic position and political contexts (World Health Organization, 2010), health literacy appeared to be a modifiable “risk factor” that could be changed through

tailored interventions (Geboers et al., 2018; Nutbeam, McGill, et al., 2018; Stormacq et al., 2019). Interventions should strive to increase health literacy levels among people with low health literacy and empower them to make better health choices (Lenartz et al., 2016; Nutbeam, 2000; Sørensen et al., 2012).

However, several literature reviews revealed insufficient or a low degree of evidence for the effectiveness of health literacy interventions (Bailey et al., 2014; Berkman et al., 2011; Neter & Brainin, 2019; Pignone et al., 2005; Poureslami et al., 2017; Visscher et al., 2018). Low levels of evidence have been attributed to various causes: weak methodological strength

due to short-term follow-ups, substantial attrition, the lack of power to estimate effect stratification across pre-intervention health literacy levels, or outcomes that reflect intermediate results (e.g., knowledge, positive attitudes, self-efficacy) rather than substantive outcomes (e.g., behavioral change or health status) (Brainard et al., 2016; Visscher et al., 2018). Furthermore, low levels of evidence have been attributed to conceptual and theoretical shortcomings. An inconsistent choice of confounding variables (out of a “myriad of variables”) may over- or underestimate the effect of health literacy and, hence, end up in mixed results and difficulties when making a synthesis (Berkman et al., 2011; Neter & Brainin, 2019; Poureslami et al., 2017).

In this study, the author focuses on another shortcoming in health literacy research, namely the lack of investigations in the most proximate outcome of health literacy—the ability to make health decision-making. Most health literacy studies are interested in its effects on health outcomes, health-related performance, or the use of health care services (Berkman et al., 2011; Muscat et al., 2021). On the other hand, health literacy definitions focus on other objectives such as “making informed choices,” “appropriate health decisions,” “informed judgements,” or “sound health decisions in the context of everyday life” (Sørensen et al., 2012; van den Broucke, 2019). Despite the sheer number of health literacy definitions, its primary objective is widely shared. Informed and personally sound decision-making is described as the most proximate outcome of good health literacy regardless of whether the decision itself is rational and comprehensible. As a secondary outcome, informed health decisions should presumably lead to less health risks and a better health, respectively (Sørensen et al., 2012).

Yet, health literacy research has not investigated the causal pathway from health literacy to decision-making ability (DMA) and, further, to health behaviors and health outcomes (Berkman et al., 2011; Poureslami et al., 2017). Hence, in this complex pathway, this study explores one important step in the decision-making process, namely one’s ability to make health decisions. The investigation of this intermediate factor is substantially important because it may provide an alternative explanation to the low evidence of intervention research. A person’s ability to make health decisions may not only be contingent on health literacy but also on contextual factors such as financial barriers, lack of time, social support, personality traits, or system-related barriers (Bröder et al., 2017; Levin-Zamir, et al., 2017; Neter & Brainin, 2019; Nutbeam, Rüegg & Abel, 2019; de Wit et al., 2020). Hence, the chances to transform health literacy into favorable health outcomes may be mediated by one’s DMA and—as antecedent factors—by one’s contextual factors. Efforts to disentangle these relationships were done in health service and counselling research.

Health service studies investigating in shared decision-making and its prerequisites emphasized the role of contextual factors. Particularly important for active involvement in shared decision-making are higher education and higher order competences such as critical health literacy (Brabers et al., 2017; Smith et al., 2009; Smith et al., 2013). In contrast, patient’s general health literacy levels were not associated with their involvement in shared decision-making (Brabers et al., 2017). Other studies emphasize the role of socially available knowledge, which appears to be crucial for a patient’s decision involvement (Gunn et al., 2021; Samerski, 2019). Furthermore, Morrow and Chin (2015) emphasize that health decisions are often emotional, value-laden issues in dynamic uncertain conditions. Such conditions require a great deal of knowledge, experience,

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and understanding of the problem situation. These results show exemplary that health decision-making is not only dependent on health literacy, but also on situational, social, emotional, and educational factors. Hence, studies need to address these contextual factors and its effects on the health decision-making process.

This study investigates this research gap, exploring the mediation role of DMA. The first hypothesis tested in the study claims DMA as a mediator between health literacy and different health outcomes. The second hypothesis claims that the effect of DMA on different health outcomes is not only contingent on health literacy, but also contingent on contextual, antecedent factors. These antecedent factors not only explain DMA, but also the potential in achieving higher health literacy levels. According to literature, five dimensions of contextual factors can be distinguished confounding the effect from health literacy to health: personal, social and cultural, situational, environmental, and socioeconomic factors (Bailey et al., 2014; Berkman et al., 2011; Bröder et al., 2017; Neter & Brainin, 2019; Paasche-Orlow & Wolf, 2007; Rudd, 2017; Rüegg & Abel, 2019; Santos et al., 2011; de Wit et al., 2020). The complete and sparse model derived from the theoretical reflections is shown in **Figure 1**.

In line with published definitions, health literacy is understood as a set of personal knowledge and skills needed to make appropriate health decisions in one's own personal context (Abel et al., 2015). In addition, health literacy and its effects on choice and health outcomes depend on contextual personal, social, situational, environmental, and socioeconomic factors.

METHODS

Data

Data from the second wave of the Young Adult Survey Switzerland, conducted between 2015 and 2016, was used for the analyses (Huber, 2019). The all-male sample was collected during the recruitment for compulsory military service with a participation rate of 90%. This sample corresponds to 14% of the eligible male population of Switzerland between ages 18 and 25 years. One-third of the participants were randomly selected for an additional health questionnaire containing health literacy items. The survey design is described in more detail elsewhere (Hofmann et al., 2013). Ethical approval for the data collection was obtained from the Federal Youth Surveys ch-x supervising board of nine members from the Swiss National Science Foundation and the Swiss Federal Statistical Office. Further approval was unnecessary due to analyses on an existing dataset.

Measures

Each of the two health indicators for general health and for health behavior were used as dependent variables. Six health

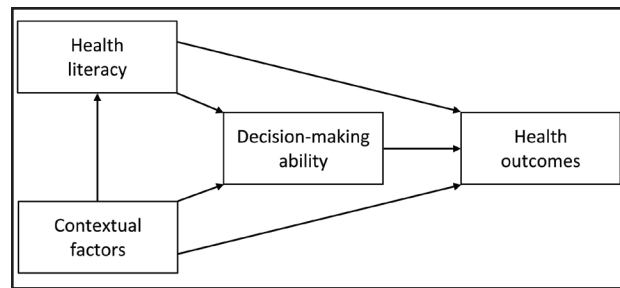


Figure 1. Empirical model including decision-making ability between health literacy and health outcomes.

literacy items were used as explanatory variables and one item for DMA (mediator). Further, 18 contextual factors (antecedent variables) were integrated in the analyses.

Health Outcomes

Due to non-normal distributions, all health outcomes were transformed into dichotomous variables where “1” represents good health or favorable health behavior respectively. Because the general level of health is high in this age group, self-rated health was categorized into 1 = *excellent* or *very good* and 0 = *good*, *less good*, or *poor* health. A validated nine-item depression diagnostic and severity measure (Patient Health Questionnaire-9) was used to measure mental health (Kroenke & Spitzer, 2002). According to Kroenke and Spitzer (2002), the index measure was transformed into 1 = *none* and 0 = *mild* or *severe* depression tendency. Observations with 1 to 3 missing values have been median imputed and included in the depression index. Observations with more than three missing values have been excluded. Smoking behavior was transformed into 0 = daily smokers and 1 = non-smokers (less than daily). Further, overweight was calculated by the body mass index (BMI), which was transformed into 1 = BMI <25 and 0 = BMI ≥25.

Health Literacy

Health literacy was measured with the “short survey tool for public health and health promotion research” validated in previous research (Abel et al., 2015). The instrument includes eight Likert-scaled items covering four questions for functional health literacy and two questions each for interactive and critical health literacy. One item (HL9) was added since the last validation: “How well do you understand oral explanations from medical professionals (e.g., in the drugstore or from physicians)?” Principle component analysis following Abel et al. (2015) extracted three distinct factors: functional health literacy (HL1, 2, 9), searching health literacy (HL3, 4), and interactive health literacy (HL5, 6). All three factors were used for analyses. HL8 was used as a singular item representing internet health

TABLE 1
Study Sample (N = 4,569)

Variable	Number	%	Mean	SD	Skewness
Health outcomes					
Self-rated health					
Very good	3,092	68.1			
Good or poor	1,450	31.9			
Mental health					
Good	3,082	67.6			
Poor	1,479	32.4			
Smoking					
No	3,091	75.2			
Yes	1,017	24.8			
Overweight					
No	3,601	80.4			
Yes	878	19.6			
Health literacy					
Somatic health knowledge					
Good	1,835	40.2			
Poor	2,734	59.8			
Mental health knowledge					
Good	2,293	50.2			
Poor	2,276	49.8			
Functional health literacy			0.04	1.382	-0.342
Searching health literacy			0.03	1.236	-1.108
Interactional health literacy			0.07	1.055	-0.275
Internet health literacy			3.19	0.684	-0.770
Decision-making ability (5 category)			3.83	0.851	-0.641
Personal (contextual) factors					
Motivation for a healthy life					
High	3,722	81.5			
Moderate and low	847	18.5			
Interest in health topics					
Yes	3,732	81.7			
No	837	18.3			
Self-regulation (executive)			16.47	3.493	-0.418
Self-regulation (evaluative)			8.37	2.083	-0.237
Self-esteem (5 category)			3.64	0.945	-0.471
Social (contextual) factors					
Number of close friends (6 category)			2.38	1.109	0.767
Strong ties to parents					
In very good hands	3,268	71.5			
In good hands and lower	1,301	28.5			
Parental financial situation					
Good	895	19.6			
Humble	3,674	80.4			
Highest parental education (5 category)			3.83	1.125	-0.627
Healthy family					
Yes	4,119	90.2			
No	450	9.9			

TABLE 1 (CONTINUED)
Study Sample (N = 4,569)

Variable	Number	%	Mean	SD	Skewness
Socioeconomic (contextual) factors					
Financial constraints					
In less than two areas of life	3,991	87.4			
In two or more areas of life	578	12.7			
Level at lower secondary school					
High	1,513	33.1			
Intermediate	2,106	46.1			
Low	950	20.8			
Migration background					
No	4,049	88.6			
Yes	520	11.4			
Environmental (contextual) factor					
Urbanization of municipality					
City	871	19.1			
Agglomeration	2,475	54.2			
Rural	1,223	26.8			
Control variable					
Language region					
German	3,294	72.1			
French	925	20.3			
Roman	350	7.7			

literacy and HL7 as a measure for DMA (see below). Observations with one or two missing values (except for HL7) have been mean imputed and included in the principal component analysis. Observations with more than two missing values have been excluded. Additionally, a measure to assess general health knowledge was applied (Cockerham et al., 1986). Seventy-five percent of the correct answers indicate sufficient mental health knowledge (7 of 9) or sufficient somatic health knowledge (6 of 8), respectively. Cut-offs have been chosen due to skewness and to maximize statistical variation.

DMA

DMA was measured by the following question: “Today, there are many advices and offers for a healthy life. How well are you doing in choosing the information and offers that fit to you the most?” The respondents could answer on a 5-point Likert-scale from *very bad* to *very good*.

Personal (Contextual) Factors

A 7-point scaled question captured one’s motivation for a healthy living ranging from *not important at all* to *extremely important* (Albert et al., 2019). The item was dichotomized to a high motivation for a healthy living (5-7) and a mod-

erate or low motivation for a healthy living (1-4). One’s interest in the topic of health was assessed with a 4-point scaled question. The item was dichotomized into 1 = *rather or very interested* and 0 = *not at all or rather not interested*. Two dimensions of self-regulation were assessed with the Locomotion-Assessment-Questionnaire (LAF) (Sellin et al., 2003). Executive self-regulation captures the degree of activity orientation to reach personal goals in the manner of “just do it.” Evaluative self-regulation captures the degree of information-seeking orientation to reach personal goals in the manner of “do the right thing.” Two sum indices of six and three items from the LAF were used to measure executive self-regulation (1-24) and evaluative self-regulation (1-13). Self-esteem was measured by the Single-Item Self-Esteem Scale with five categories (Robins et al., 2001).

Social (Contextual) Factors

The number of close friends was captured with six distinct categories (0, 1-3, 4-6, 7-9, 10-12, >12). Strong ties to parents were measured by the feeling to be in good hands. Due to skewness this item was transformed into a binary variable 1 = *in very good hands* and 0 = *in good hands and lower*.

TABLE 2

Linear Regressions of the Decision-Making Ability on Health Literacy and Other Determinants in Models A and B Without and With Contextual Factors

Variable	Decision-making ability (model A)		Decision-making ability (model B)		
	Beta	95% CI	Beta	95% CI	cp %
Health literacy					
Somatic health knowledge	0.031	[-0.02, 0.08]	0.010	[-0.04, 0.06]	-
Mental health knowledge	0.072**	[0.03, 0.12]	0.074**	[0.03, 0.12]	-2.9
Functional health literacy	0.059***	[0.04, 0.08]	0.046***	[0.03, 0.07]	22.3
Searching health literacy	0.124***	[0.10, 0.15]	0.084***	[0.06, 0.11]	32.3
Interactive health literacy	0.180***	[0.13, 0.22]	0.175***	[0.13, 0.22]	2.8
Internet health literacy	0.091***	[0.07, 0.12]	0.056***	[0.03, 0.08]	38.3
Contextual factors					
Personal					
Motivation for a healthy life			0.211***	[0.15, 0.28]	
Interest in health topics			0.128***	[0.06, 0.19]	
Self-regulation (executive)			0.034***	[0.03, 0.04]	
Self-regulation (evaluative)			-0.016	[-0.03, -0.00]	
Self-esteem			0.045**	[0.02, 0.07]	
Social					
Number of close friends			0.017	[-0.00, 0.04]	
Strong ties to parents			0.082**	[0.03, 0.13]	
Situational (parenthood)					
Humble financial situation			0.010	[-0.05, 0.07]	
Highest parental education			-0.003	[-0.03, 0.02]	
Healthy family			0.142***	[0.06, 0.22]	
Socioeconomic					
Financial constraints			-0.109	[-0.18, -0.04]	
Low secondary degree (reference)					
Middle secondary degree			0.109	[0.04, 0.17]	
High secondary degree			0.118	[0.05, 0.19]	
Migration background			-0.056	[-0.13, 0.02]	
Environmental					
Agglomeration			0.028	[-0.03, 0.09]	
Rural			0.014	[-0.06, 0.08]	
Intercept	3.194***	[3.04, 3.34]	1.910***	[1.63, 2.19]	
R ²	0.145		0.210		
Observations	4,569		4,569		

Note. Data from Young Adult Survey Switzerland, 2015 and 2016. Statistically significant coefficients in model A. Control variable: Swiss language regions. CI = confidence interval; cp = confounding percentages.
 ***p < .001.
 **p < .01.
 *p < .05.

Situational (Contextual) Factors

The parental financial situation was dichotomized into 0 = good and very good and 1 = humble and very humble according to a self-reported question. Highest parental education was assessed by 1 = primary education to 5 = tertiary education according to the International Standard Classification of Education scale. The role of a healthy lifestyle in the fam-

ily was dichotomized into 0 = not important and 1 = rather or very important.

Socioeconomic (Contextual) Factors

Financial constraints were measured by a personal lack of money in two or more of the following areas of life: health costs, education, rent, internet, and clothes. The educational level

was assessed by the school level at the end of lower secondary school at age 16 years (9th year in school). The three different secondary levels of education “Realschule,” Sekundarschule,” and “Gymnasium” were renamed with a low, intermediate, and high level. Young adults without Swiss nationality were categorized as people with migration background.

Environmental (Contextual) Factor

The degree of urbanization was assessed using the zip codes of the residential municipality. Municipalities were assigned to the three categories city, agglomeration, or rural.

Control Variable

One control variable was included in the analyses, namely the three language regions of Switzerland speaking German, French, or Roman (Italian and Rhaeto-Romanic).

Analyses

STATA 15.1 and the user written Karlson, Holm, and Breen (KHB) package was used for linear and logistic regression analyses and to estimate mediation effects. The KHB analysis allows for an unbiased comparison of regression coefficients between nested models, and hence the decomposition of coefficients into explained and unexplained proportions (Karlson et al., 2012; Kohler et al., 2011). Further, chi-square statistics was applied to compare nested models in their predictive ability (Cleves, 2002).

The mediation analysis was conducted along the three-steps procedure described by Baron and Kenny (1986). First, the effects of health literacy on DMA were estimated when controlling for contextual factors. The KHB method was applied to estimate the confounding ratios between crude health literacy coefficients and those including contextual factors (analyses I). Second, the direct effects of health literacy on health outcomes were estimated when controlling for contextual factors. Again, the KHB method was applied to estimate the confounding ratios between the crude health literacy coefficients and those including contextual factors. Furthermore, chi-square statistics was used to compare model fit (analyses II). Third, the effects of DMA on health outcomes were estimated including health literacy and contextual factors stepwise. Mediation effects were estimated by using confounding ratios. Again, chi-square statistics was applied to estimate additional predictive ability attributable to the DMA (see the section below: “Analyses III: Mediation Effects of DMA”).

RESULTS

The additional questionnaire with specific health literacy questions was filled out by one-third of the respondents

($N = 12,073$). After case-wise deletion due to missing values, a net sample of $n = 4,569$ was used for the analyses. No further imputation strategy was needed due to sufficient statistical power and strong variation among variables. The items variations of the net sample are displayed in **Table 1**.

Analysis I: Determinants of the DMA

Initially, the DMA was regressed on health literacy and contextual factors with two nested linear models (**Table 2**). The explained variation $R^2 = 0.210$ of model B can be interpreted as acceptable fit. All health literacy items, except for physical health knowledge, were positively associated with DMA (level of significance: $p < .01$). Four health literacy coefficients were significantly reduced when including contextual factors (22.3%-67%). The coefficients of mental health knowledge and interactional health literacy were only marginally confounded by the contextual factors. Statistically insignificant coefficients (executive self-regulation, critical attitude, number of friends, migration background, parental financial situation, parental highest education, agglomeration, and rural environment) may also have statistically significant effects on the DMA but may be suppressed by health literacy as mediator.

Analyses II: Controlled Direct Effects of Health Literacy

In a second step, the total direct effects of health literacy were estimated by regressing each of the four health outcomes on the health literacy items and the contextual factors (**Table 3**). The results show that all statistically significant health literacy coefficients in the crude model are confounded by contextual factors (0.5%-66.9%). Controlling for contextual factors, only few health literacy coefficients remain statistically significant. The chi-square statistics confirm the marginal role of health literacy to explain self-rated health, non-smoking, and non-overweight. Health literacy could not increase the predictive ability in these models. Focusing on the health literacy items separately, psychological health knowledge and searching health literacy were positively associated with two health outcomes each.

Analyses III: Mediation Effects of DMA

Finally, stepwise confounding analyses were applied to explore the mediating role of DMA between health literacy and health outcomes (**Table 4**). The crude associations between DMA and health outcomes are statistically highly significant ($1.188 \leq \text{odds ratio} \leq 1.744$; $p < .001$). Controlling for all six health literacy items, the coefficients decrease by 6.1% to 20.3%. These results indicate that the DMA is a mediator between health literacy and health outcomes. When

TABLE 3

Comparison of Nested Logistic Models Regressing Health Outcomes on Health Literacy and Contextual Factors

Variable	Self-Rated Health			Mental Health			No Smoking			Not Overweight		
	OR	95% CI	cp %	OR	95% CI	cp %	OR	95% CI	cp %	OR	95% CI	cp %
Health literacy												
Somatic health knowledge	1.041	[0.90, 1.20]		1.194	[1.03, 1.39]	28.2	1.178	[1.00, 1.38]	42.9	1.152	[0.98, 1.35]	35.1
Mental health knowledge	1.027	[0.89, 1.18]		1.234**	[1.07, 1.43]	0.5	1.003	[0.86, 1.17]		1.247**	[1.06, 1.46]	32.0
Functional HL	1.032	[0.98, 1.09]		1.067	[1.01, 1.13]	31.1	0.932	[0.88, 0.99]		1.024	[0.96, 1.09]	
Searching HL	1.125***	[1.06, 1.20]	56.7	1.135***	[1.07, 1.21]	61.6	0.952	[0.89, 1.02]		0.940	[0.87, 1.01]	
Interactional HL	1.055	[0.99, 1.13]	66.9	0.903**	[0.84, 0.97]		0.951	[0.88, 1.02]		1.057	[0.98, 1.14]	
Internet HL	0.977	[0.87, 1.09]		0.977	[0.87, 1.10]		1.184**	[1.05, 1.34]	25.3	0.968	[0.85, 1.10]	
Pseudo R ²	0.178			0.169			0.070			0.036		
AUC, null model a	0.716	[0.70, 0.73]		0.760	[0.75, 0.78]		0.672	[0.65, 0.69]		0.627	[0.60, 0.64]	
AUC, full model b	0.721	[0.71, 0.74]		0.768	[0.75, 0.78]		0.678	[0.66, 0.70]		0.621	[0.61, 0.65]	
Difference (chi-square)	6.19			13.6***			5.16			2.62		
Observations	4542			4561			4108			4479		

Note. Note: Data from Young Adult Survey Switzerland, 2015 and 2016. Statistically significant effects when contextual factors were excluded are not displayed. Model A, null model; including contextual factors; model B, full model; including health literacy items and contextual factors. AUC = area under the curve; CI = confidence interval; cp = confounding percentages; OR = odds ratio.
 ***p < .001.
 **p < .01.

controlling for health literacy contextual factors, the crude coefficients decrease by 12.6% to 58%. These results support the mediating role of DMA between contextual factors and health outcomes. Furthermore, chi-square statistics indicate that the DMA cannot be completely explained by health literacy and contextual factors in the first two models.

DISCUSSION

Strengthening health literacy levels in populations is particularly attractive in modern societies which are strongly built on freedom of choice. Therefore, health literacy appears to be a remedy to achieve equal chances for good health without reducing autonomy and self-determination. On the other hand, the idea of strengthening health literacy in populations to enhance general health is contrasted by scarce evidence for health literacy intervention effectiveness (Neter & Brainin, 2019; Poureslami et al., 2017; Visscher et al., 2018).

This study investigated the pathway from health literacy to health, assuming that the DMA plays a crucial role to explain the low evidence of health literacy intervention effectiveness. Hence, the mediating role of DMA was tested on four different health outcomes using six health literacy indicators and five dimensions of contextual factors. An all-male sample of young adults in Switzerland was used to test the mediation hypotheses according to Baron and Kenny (1986).

The analyses confirmed that the DMA is a mediator on the pathway between health literacy and its contextual factors on the one side and health outcomes on the other. However, our analyses revealed health literacy itself as mediator between contextual factors and health. These results support the hypothesis that higher health liter-

acy levels do not automatically lead to better health. Rather, the widely shared objective of health literacy, the ability to make informed health decisions, is only partially contingent on health literacy and much more contingent on contextual factors such as those applied in the analyses. With other words, the immediate objective of higher health literacy levels cannot exclusively be attributed to health literacy alone. Diverse contextual factors may reduce or impede positive effects on favorable health outcomes.

The study results call for more investigations in the health decision-making process. A range of personal, socio-cultural, situational, socioeconomic, and environmental factors can thwart the pathway from health literacy to decision-making and favorable health outcomes. On the other hand, some health literacy dimensions, such as psychological health knowledge and skills in information seeking, appeared to be the most promising factors supporting favorable health outcomes.

STRENGTHS AND LIMITATIONS

The analyses were restricted to an all-male sample. Even though young male adults are a particularly interesting subpopulation (e.g., regarding their health-risk behaviors) the present findings suggest conducting similar studies in gender inclusive contexts and in other age groups. Hence, these limitations call for caution when generalizing the results. Furthermore, the statistical analyses were conducted on the grounds of a simplified empirical model. Further studies are need-ed to explore additional intermediary steps and more contextual factors that may be relevant in the pathway from health literacy to health outcome. Finally, the theoretical mechanisms were test-ed with cross-sectional data. It is suggested that more studies with longitudinal data need to be carried out.

There are noticeable strengths of this study. The data collection during the military recruitment procedure ensures many participants of all social strata and personal characteristics. Hence, the statistical power of the net sample is high and ensures robust estimates using many covariates. This is one of only a few studies that

TABLE 4

Stepwise Confounding Analyses Using Logistic Models Regressing Health Outcomes on Decision-Making Ability

Variable	Self-Rated Health			Mental Health			No Smoking			Not Overweight		
	OR	95% CI	cp %	OR	95% CI	cp %	OR	95% CI	cp %	OR	95% CI	cp %
Decision-making ability (crude coefficient)	1.704***	(1.58,1.84)		1.744***	(1.62,1.88)		1.356***	(1.25,1.47)		1.188***	(1.09,1.29)	
Decision-making ability (including health literacy items)	1.536***	(1.42,1.67)	20.3	1.607***	(1.48,1.74)	16.5	1.332***	(1.22,1.46)	6.7	1.177***	(1.07,1.29)	6.1
Decision-making ability (including HL items and contextual variables)	1.287***	(1.18,1.40)	57.2	1.326***	(1.21,1.45)	58.0	1.211***	(1.10,1.33)	39.0	1.162**	(1.06,1.28)	12.6
AUC, null model a	0.728	(0.71,0.74)		0.773	(0.76,0.79)		0.683	(0.66,0.70)		0.633	(0.61,0.65)	
AUC, full model b	0.721	(0.71,0.74)		0.768	(0.75,0.78)		0.678	(0.66,0.68)		0.627	(0.61,0.65)	
Chi-square (delta)	11.6***			6.6**			3.9			4.3		
Observations	4542			4561			4108			4479		

Note. Data from Young Adult Survey Switzerland, 2015 and 2016. Model A, null model; including health literacy items and contextual factors; model B full model; including decision-making ability to the null model. AUC = area of the under; CI = confidence interval; cp = confounding percentages; OR = odds ratio.

***p < .001.
**p < .01.

investigates the health literacy pathway using a broad range of contextual factors.

CONCLUSIONS

We found that the DMA is an important mediator between health literacy and health outcomes. The results support the hypothesis that higher health literacy levels do not lead to better health directly. Rather, the significant role of contextual factors reveals that health literacy is just one of multiple factors, which contribute to a higher DMA and, further, to favorable health outcomes. The study's results call for more investigations to be done in the health decision-making process to gain a better understanding of the transformation of health literacy into favorable health outcomes.

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