Digital Health Literacy of Parents and Health-Related Quality of Life of Their Children with Type 1 Diabetes Mellitus

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OBJECTIVES

The increased use of digital medical devices in pediatric diabetes management puts increased digital health literacy expectations on parents.

We aimed to assess parents' digital health literacy, the health status of their children with Type 1 diabetes mellitus (T1DM) and explore the determinants of children's glucose control status.

METHODS

Study design and patients

A cross-sectional study was carried out in 2022. Dyads of parents and children with T1DM aged 8-15 years attending a university pediatric diabetes center in Hungary were invited to participate in the questionnaire survey.

Survey

Sociodemographic characteristics (sex, age) were recorded. Regarding child's T1DM, the type of blood glucose measurement (conventional, sensor) and insulin administration (pen, pump), glucose control status (average HbA1C level in the past 6 months) were documented.

Parents reported the extent the child's T1DM impacts their own life on a visual analogue scale (VAS; 0: not at all, 10: to the greatest extent you can imagine). Diabetologists' opinion on how difficult it is to manage the disease were assessed on a VAS (0: the worst you can imagine, 10: the best you can imagine)

Measurement tools

Parents' digital health literacy was measured with the eHEALS[1] questionnaire. The eHEALS comprises 8 items covering awareness (1, 2), searching (3, 4), appraisal of health resources found on internet (6, 7) and utilisation of health information (5, 8). Each item is scored on a five-point Likert-scale (from 1 - "strongly disagree" to 5 - "strongly agree"). To calculate eHEALS score, items are added (range 8-40), with higher scores indicating greater skill.

In addition, parents' general health literacy (New Vital Sign, NVS)[2], fear of hypoglycemic episodes (Hypoglycaemia Fear Survey, HFS)[3] and self-efficacy as a caregiver (Parental Self-Efficacy Scale for Diabetes Management, PSESDM)[4] were assessed.

Children's quality of life was examined with the Pediatric Quality of Life Inventory (PedsQL)[5] Generic Core Scales and the EQ-5D-Y[6] measures.

Statistics:

Group differences were assessed by parametric and non-parametric tests. Correlations between parental characteristics and children's quality of life were anaylsed. Determinants of children's HbA1C level were investigated by multiple linear regression analysis.

RESULTS

At the time of the interim analysis (October, 2022), the total number of dyads was N=121. Parents' (mean age 42.5 ±5.8 years, 81.1% female) average scores were: eHEALS 31.6 (±4.6), NVS 4.4 (±1.8), HFS 41.2 (±12.8), and PSESDM 32.6 (±5.5). Distribution of parents' eHEALS responses is shown in Figure 1.

### Figure 1. Distribution of parents' responses by eHEALS items
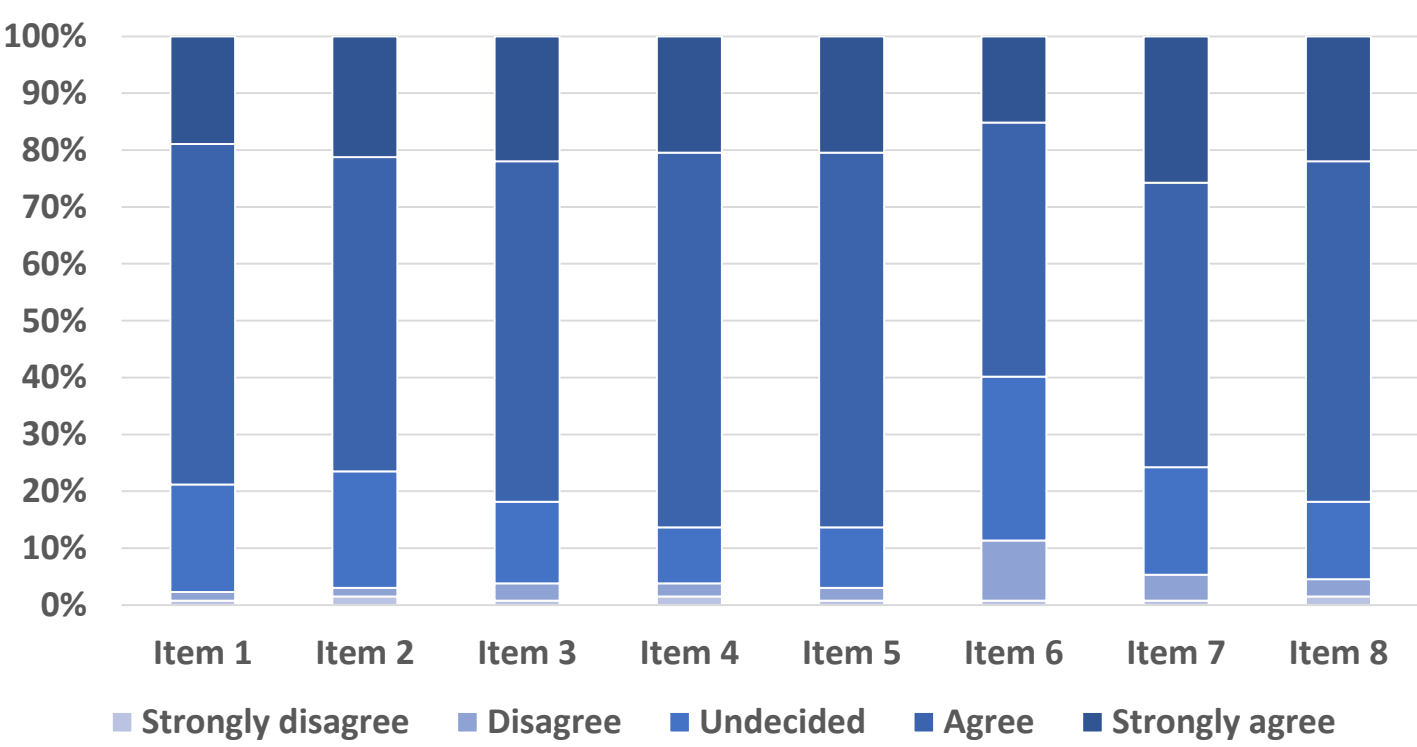
Treatment modalities were pen (N=31), pen+sensor (N=48), and insulin pump+sensor (N=42, one child was without a sensor).

Parents' eHEALS [$F_{(2,118)}$=4.4, p=0.014], and NVS [$F_{(2,118)}$=14.9, p<0.001] scores differed significantly across treatment modalities (Figure 2)

Figure 2. Parents' digital and general health literacy by treatment regimens
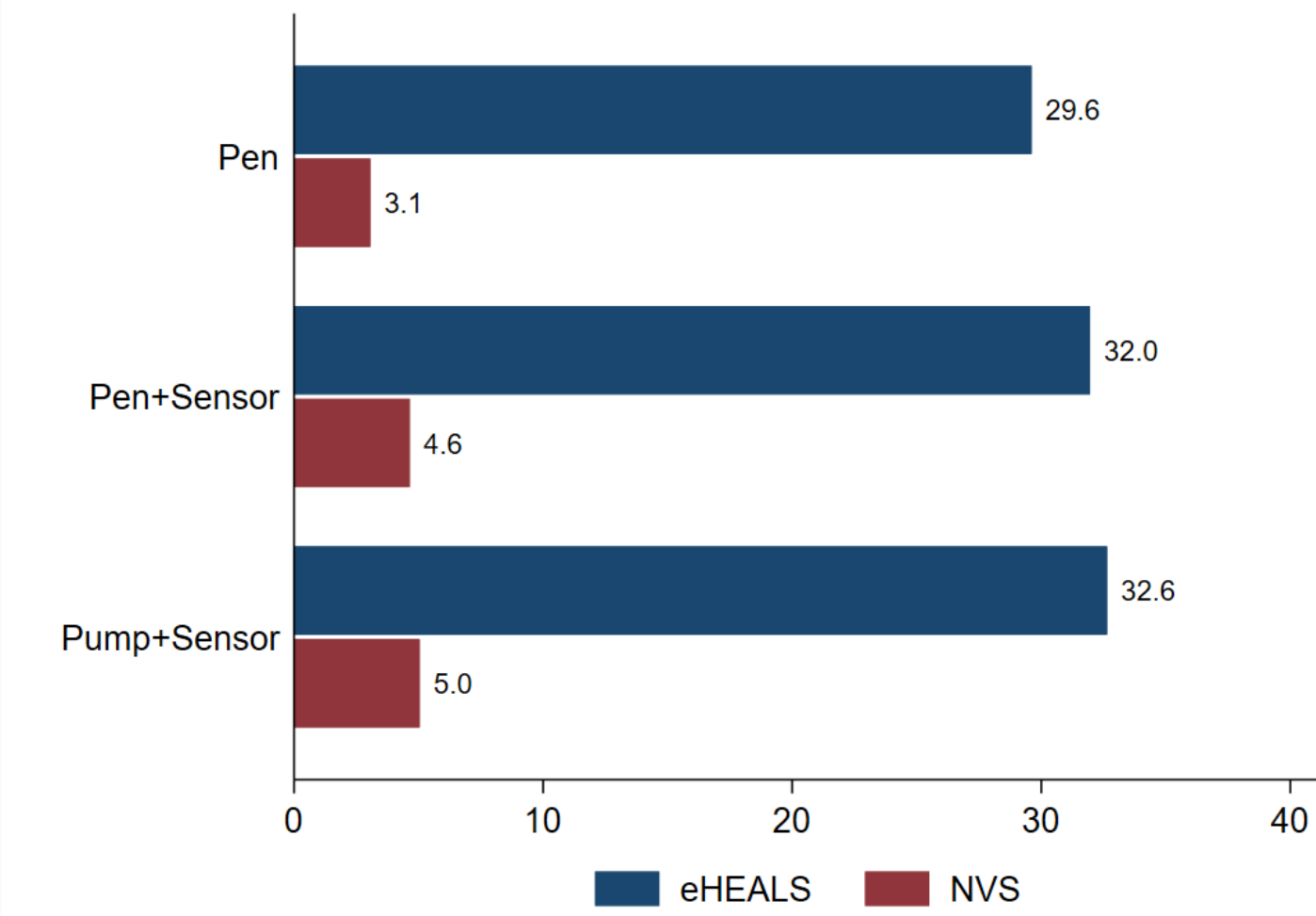
Children's (mean age 11.8 ±1.8 years, 48.5% female) average HbA1C in the past 6 months was 7.6 (±1.3), while PedsQL and EQ-5D-3L-Y were 80.4 (±13.5) and 0.93 (±0.10), respectively.

Glucose control (average HbA1C in the past 6 months) moderately correlated with eHEALS (r=-0.342) and parents' self-efficacy in managing child's diabetes (r=-0.453), but no significant correlations were observed between children's quality of life and parents' digital/health literacy (Figure 3).

Figure 3. Correlation of parental scores, children's quality of life, and disease control
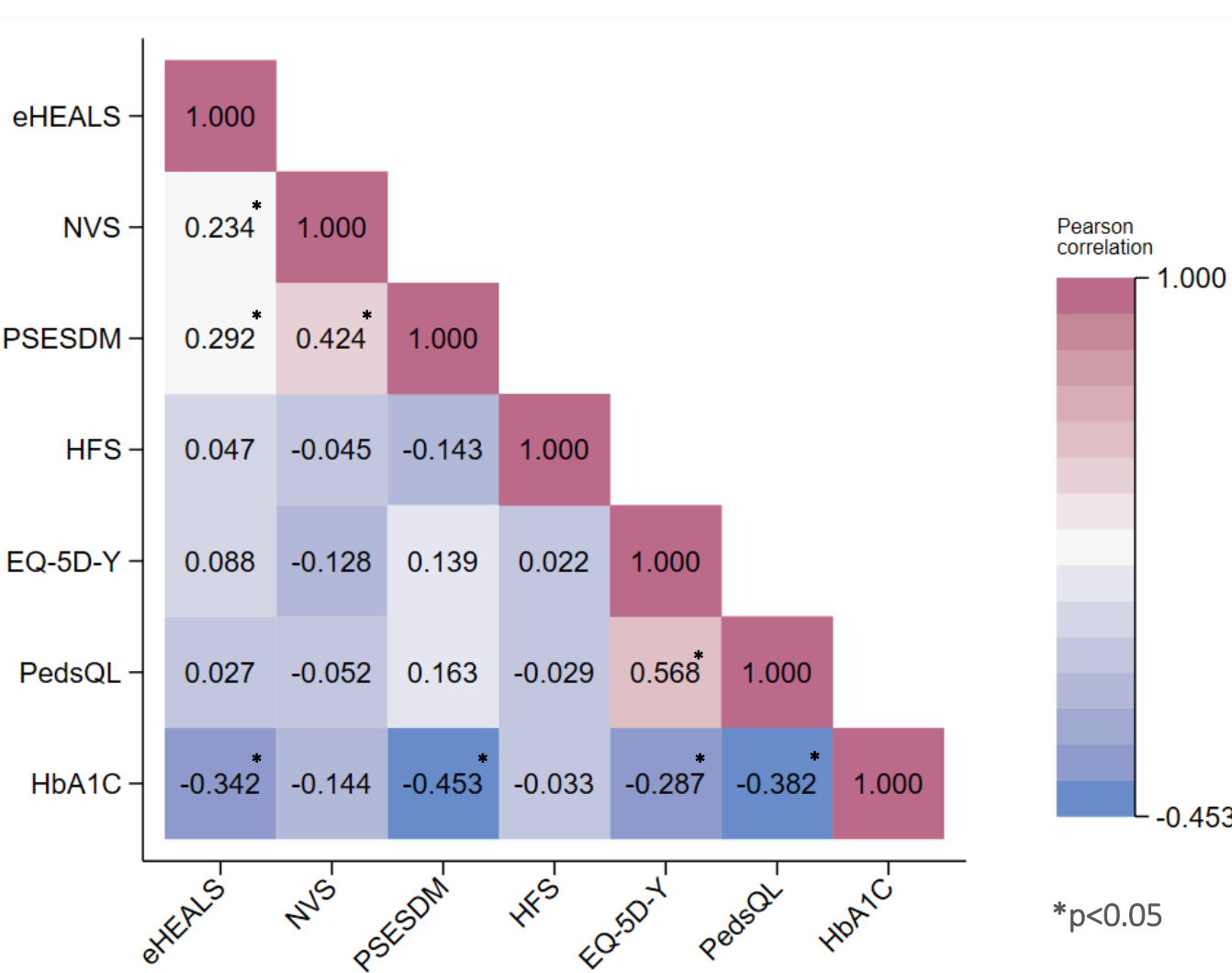
Regression analysis indicated that children's HbA1C level was significantly associated with EQ-5D-3L-Y index score, diabetologist's opinion on the difficulty of managing the disease, self-reported impact of child's T1DM on parents' life, hyperglycemic and other adverse events in the past 3 months, but not with parents' literacy scores (data not shown).

CONCLUSIONS

Results of this first explorative study suggest that parents' digital health literacy might affect the treatment choice in pediatric T1DM. However, no associations with disease outcomes were found. Further prospective studies are encouraged to explore whether eHEALS could be used as a predictor of parents' capabilities to accept and cope with different treatment modalities.

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PROJECT FINANCED FROM THE NRDI FUND