

## **Supplementary material**

### **A. Search strategy**

The search strategy was the combination of concepts 1, 2, 3, and 4. These concepts consisted of MeSH terms, keywords, and free terms with appropriate adjustments in each database, employing Boolean operators (OR, AND) to construct the search strategy and emphasize the population, intervention, comparator, and outcome.

#### **1. Concept #1: Digital interventions**

Keywords: "Social Media" OR "Social Network" OR "Facebook" OR "Instagram" OR "TikTok" OR "Twitter" OR "YouTube" OR "chatbot" OR "Reddit" OR "WeChat" OR "Snapchat" OR "virtual assistant" OR "conversational agent" OR "artificial intelligence assistant" OR "virtual agent" OR "chat agent" OR "online" OR "online platform" OR "internet" OR "digital media" OR "artificial intelligence" OR "technology"

Mesh terms: Social Media [MeSH Terms]

#### **2. Concept #2: Nudging and behavior**

Keywords: "Nudge" OR "cognitive bias" OR "behavioral therapy" OR "behavior"

Mesh terms: Heuristic [MeSH] OR economics, Behavioral [MeSH] OR Cognitive Psychology [MeSH] OR Choice Behavior [MeSH] OR Health Communication [MeSH]

#### **3. Concept #3: Early and middle adolescent and their parents**

Keywords: "adolescent" OR "adolescence" OR "teen" OR "youth" OR "young" OR "pre-adult" OR "juvenile" OR "child" OR "childhood" OR "teenager" OR "teens" OR "pediatric" OR "young adult" OR "parent" OR "mother" OR "father" OR "relatives" OR "family" OR "guardian" OR "caregiver"

Mesh terms: adolescent [MeSH] OR parents [MeSH]

#### **4. Concept 4: HPV immunization**

Keywords: "immunization" OR "vaccine" OR "vaccination" OR "immunization coverage" OR "HPV" OR "human papillomavirus" OR "papillomavirus" OR "Gardasil" OR "Cervarix"

Mesh terms: vaccination coverage [MeSH] OR human papillomavirus virus vaccine [MeSH]

#1 AND #2 AND #3 AND #4