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# Digital Interventions for Youth Health: Insights from a Comprehensive Scoping Review

Exploring Longitudinal Impacts of Everyday Digital Technology Use on Youth Well-being

**Preetika Banerjee, January 2025**

This report has been made possible by financial contribution from Fondation Botnar, Switzerland, to the Project IMG-22-005 “Digital Transformations of Health Lab (DTH-Lab). Their commitment to advancing global health is deeply appreciated, and this project would not have been possible without their contribution. DTH-Lab is hosted by Université de Genève (UNIGE), Switzerland. DTH-Lab is committed to ensuring and enabling Global Access. The knowledge and information gained from the Project will be promptly and broadly disseminated and its ‘Funded Developments’ will be made available and accessible free of costs. The Global Access Commitments will survive the term of the Project.

Suggested citation: Banerjee, P (2025) Digital Interventions for Youth Health: Insights from a Comprehensive Scoping Review. Geneva: Digital Transformations for Health Lab.

# Acknowledgements


- I would like to express my sincere gratitude to Louise Holly for her invaluable mentorship and guidance throughout this project. Her expertise and thoughtful feedback have been instrumental in shaping this work. I also want to thank Aferdita Bytyqi for providing me with this opportunity and for her continued support during the course of this project.
- Additionally, I extend my thanks to the Digital Transformations for Health Lab at Ashoka University for their support, which made this work possible.

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# CONTENTS

# ABSTRACT

**Objectives:** To identify longitudinal studies examining the impacts of everyday digital technologies, such as social media, gaming, and Internet use, on the health and well-being of youth (≤25 years). This review categorizes key trends, geographical representation, and research gaps across nine thematic areas.

**Methods:** A systematic search of PubMed, Embase, and PsycArticles (2014–2024) identified 456 studies. Data extraction covered demographics, digital technology categories, and health outcomes. Studies were grouped into six key themes:

1. Social Media Use and Mental Health
2. Digital Addiction and Behavioural Outcomes
3. Physical Activity and Digital Technology
4. Digital Health Interventions and Cognitive Development
5. Parental Influence and Digital Technology
6. Digital Well-being and Risk Behaviours

**Results:** Of the 456 studies identified, 268 were relevant to our research aims. Internet use (201 studies), social media (140 studies), and gaming (83 studies) dominated the themes. Mental health was the most frequently assessed outcome, with a focus on anxiety and depression. Geographically, 15 per cent of studies originated from low- and middle-income countries, with the majority from high-income settings such as the US (76 studies) and Australia (15 studies). Nearly half (49 per cent) were published post-2020, reflecting heightened interest during the COVID-19 pandemic.

**Conclusions:** This review highlights the diverse impacts of everyday digital technology use on youth well-being, with a notable focus on mental health outcomes. However, gaps exist in exploring physical health, educational impacts, and equity-focused research. Findings emphasize the need for policies and interventions tailored to address both risks and benefits, particularly in underrepresented populations.

# 1. INTRODUCTION

The rapid expansion of digital technologies in recent decades has profoundly shaped the lives and well-being of young people worldwide. With the increasing use of the Internet, social media, and mobile devices, youth are exposed to both opportunities and risks in ways that previous generations have not experienced (Dienlin, T., & Johannes, N.,2020). This digital transformation, however, presents significant challenges for researchers, policymakers, and educators striving to understand its impact on youth health, development, and educational outcomes. The interaction between digital technologies and young people's lives is multifaceted, encompassing a wide range of behaviours, from social media use to online gaming, and raising important questions about the effects of such engagement on mental health, physical well-being, and social connections (Odgers, C. L., & Jensen, M. R. ,2020).

Several longitudinal studies have been instrumental in tracking the impact of digital engagement on young people's well-being. The Young Lives project, for instance, provides critical data on the relationship between digital access, skills, and youth outcomes across diverse global contexts. Through its quantitative surveys and digital module, Young Lives has tracked changes in digital access and skills over time, offering insights into how digital technologies intersect with social and educational inequalities, particularly in low- and middle-income countries (Young Lives, 2022). Their work has underscored the importance of digital literacy and equitable access, highlighting how digital inclusion — or the lack thereof — can influence health and educational outcomes (Young Lives, 2022).

Similarly, the Health Behaviour in School-aged Children (HBSC) study has provided valuable data on the behaviours, health, and well-being of young people. This ongoing study, which collects data on a wide range of topics, including digital device usage and its impacts, allows researchers to examine how digital engagement correlates with mental and physical health outcomes (Inchley et al., 2023). One area of growing concern is the relationship between social media use and mental health, particularly in the context of the COVID-19 pandemic, where social media and digital communication became vital lifelines for many young people (Health Behaviour in School-aged Children, HBSC, 2024).

The Global Kids Online initiative explores how children's digital access and engagement impact their social, emotional, and cognitive development. Its international surveys highlight the digital divide and how unequal access to technology deepens existing inequalities. (Global Kids Online, 2022).

## 1.1. Objectives

This paper aims to identify and synthesize existing longitudinal studies on the relationship between digital interventions and the health and well-being of young people under the age of 25. Specifically, it will explore young people's everyday use of digital technologies, including the Internet, social media, and online gaming, to understand how these technologies influence their health outcomes. This research will contribute to a comprehensive understanding of how digital engagement impacts youth well-being and identify potential interventions to address associated risks. Ultimately, the findings will inform future research and policy development aimed at optimizing the role of digital technologies in young people's lives.

# 2. METHODS

## 2.1. Search Strategy

A comprehensive literature search was conducted in PubMed, Embase, and PsycArticles to identify relevant studies published between 2014 and 2024. Search strategies were developed using the PICOTS framework (Table 1). Keywords related to the specified population and interventions were used to refine searches across databases. Boolean operators were employed to combine terms such as "youth," "adolescent," "digital technology," and "longitudinal study" to target relevant research (Appendix 1).

## 2.2. Study Screening

A total of 452 studies were initially identified in the screening process. After applying the inclusion criteria, 268 studies were deemed relevant to the research question, focusing on longitudinal studies that examine the impact of digital interventions on youth well-being (Figure 1). The remaining 184 studies were excluded due to irrelevance, as they did not meet the criteria for addressing digital interventions or youth well-being outcomes in a longitudinal framework. This rigorous screening process ensured that only studies directly aligned with the research objectives were included for synthesis and analysis.

### 2.2.1. Inclusion Criteria

- **Study Design:** Only longitudinal studies were included, ensuring the research assessed the impact of digital interventions over time.
- **Population:** Studies focused on young people under the age of 25, as the research aims to understand the digital engagement and well-being of youth.
- **Interventions**: Studies that examine digital interventions or digital engagement (including Internet use, social media, or online gaming) as the primary exposure or variable.
- **Outcomes:** Studies assessing health and well-being outcomes, such as mental health (e.g., anxiety, depression), physical health, or social well-being, were included.
- **Language:** Only studies published in English were considered for inclusion.
- **Publication Status:** Peer-reviewed articles, including those published in journals or conference proceedings, were included.

### 2.2.2. Exclusion Criteria

- **Study Design:** Cross-sectional studies, experimental studies, and those without a longitudinal follow-up period were excluded.
- **Population:** Studies focused on populations outside of youth (e.g., adults, elderly) or studies that did not focus on individuals under the age of 25 were excluded.
- **Interventions:** Studies that did not involve digital interventions or technologies (e.g., face-to-face interventions or non-digital therapies) were excluded.
- **Outcomes:** Studies that did not assess health and well-being outcomes related to digital engagement (e.g., those focused solely on academic achievement or other unrelated outcomes) were excluded.
- **Language:** Studies not published in English were excluded to ensure consistency in data analysis and interpretation.
- **Publication Status:** Non-peer-reviewed articles, grey literature, and unpublished works were excluded to maintain the rigour and reliability of the included studies.

## 2.3. Data Extraction

For each study, we extracted key data to organize and analyse the findings effectively. The following variables were recorded:

- Title: The full title of the study for accurate identification.
- Abstract: A summary outlining the study's aims, methods, and results.
- Journal: The journal in which the study was published.
- Volume, Issue, Pages: Journal volume, issue number, and page range for citation purposes.
- Authors: The research team behind the study.
- DOI: The Digital Object Identifier (DOI) for easy access to study.
- Theme: The main research focus (e.g., Social Media, Video Games, Mobile Applications).
- Sub-theme: A more specific focus within the theme (e.g., for social media: “Impact on Mental Health”).
- Age Group: The age category of the participants (e.g., child, adolescent, young adult).
- Study Type: The design of the study (e.g., longitudinal, cross-sectional).
- Outcome Type: The health or well-being outcome being assessed (e.g., mental health, cognitive development).
- Gender: The gender breakdown of the study population (e.g., male, female, mixed).
- Geographical Focus: The region or country where the study took place.
- Study Name: The official name of the study, if available.
- Leading Institution: The institution responsible for the research.

## 2.4. Themes Identified

Six key themes were assigned to the studies based on their content and focus:

1. Social Media Use and Mental Health: Studies exploring the relationship between social media engagement and various mental health outcomes, including anxiety, depression, and social well-being.
2. Digital Addiction and Behavioural Outcomes: Research investigating the addictive potential of digital technologies and their effects on behaviour, such as compulsive use of social media or video games.
3. Physical Activity and Digital Technology: Studies examining the interaction between physical activity levels and digital technology use, including how digital interventions may influence exercise behaviours.
4. Digital Health Interventions and Cognitive Development: Research focused on the use of digital tools, such as mobile apps and telemedicine, to enhance cognitive development and support educational outcomes in young people.
5. Parental Influence and Digital Technology: Studies exploring the role of parents in shaping their children's use of digital technologies, including the impact of parental guidance on digital behaviours.
6. Digital Well-being and Risk Behaviours: Research addressing how digital technology impacts risk behaviours such as substance abuse, risky sexual behaviour, and online safety concerns.

# 3. RESULTS

The scoping review encompassed a total of 268 studies, which provided insight into various aspects of digital technology use and its impact on the health and well-being of young people. Internet use (201 studies), social media (140 studies), and gaming (83 studies) dominated the themes. Mental health was the most frequently assessed outcome, with a focus on anxiety and depression. Geographically, 15 per cent of studies originated from low- and middle-income countries, with the majority from high-income settings such as the US (76 studies) and Australia (15 studies) (Figure 2). Nearly half (49 per cent) were published post-2020, reflecting heightened interest during the COVID-19 pandemic.

The analysis of these studies revealed six key themes: social media use and mental health, digital addiction and behavioural outcomes, physical activity and digital technology, digital health interventions and cognitive development, parental influence and digital technology, and digital well-being and risk factors. Each theme highlights important findings related to digital health interventions, behaviours, and outcomes for youth.

## Theme 1: Social Media Use and Mental Health

A total of 69 studies focused on the effects of social media on adolescent mental health. Of these, 45 studies examined depression and anxiety, showing a strong association between increased social media use and negative mental health outcomes, particularly depression and anxiety. Six studies explored the influence of social media on self-esteem and body image, indicating that social media can exacerbate body dissatisfaction, especially among adolescent girls (Houghton et al., 2018; Twenge & Campbell, 2018; Orben & Przybylski, 2020; Holland & Tiggemann, 2016; Smith et al., 2022; Radesky et al., 2015). Nine studies addressed the issue of cyberbullying, which was found to significantly affect mental health, with higher risks of depression, anxiety, and suicidal ideation (Wang & Degol, 2017; Viner et al., 2019; Hamer et al., 2009; Twenge et al., 2018; Coyne et al., 2015; George & Odgers, 2015; Boers et al., 2019; Brunborg et al., 2016; Kowalski et al., 2014). Nine studies also highlighted positive aspects of social media use, such as online support groups and mental health resources (Patrick et al., 2022; Liao et al., 2021; Kelly et al., 2018; Keles et al., 2020; Oberst et al., 2017; Bányai et al., 2017; Drouin et al., 2020; Houghton et al., 2018). Overall, the studies suggest that social media use has a complex, bidirectional relationship with mental health, with both positive and negative outcomes.

## Theme 2: Digital Addiction and Behavioural Outcomes

This theme reviewed 102 studies on the impact of digital addiction. The majority of the studies (56 observational) demonstrated the link between excessive digital technology use, particularly Internet and gaming addiction, and behavioural issues like anxiety, depression, and poor social functioning. Notably, Internet addiction (39 studies) and gaming addiction (38 studies) were strongly correlated with poor mental health and academic performance, while smartphone dependency (four studies) and behavioural disorders (20 studies) further exacerbated existing mental health issues. Among 36 intervention studies, 54 per cent reported positive outcomes in terms of digital addiction treatment and management. However, a significant portion of studies revealed the harmful effects of excessive digital use, which disrupted sleep, increased mental health symptoms, and led to social isolation. Longitudinal research emphasized the long-term psychological consequences, such as increased depression and anxiety, associated with digital addiction.

## Theme 3: Physical Activity and Digital Technology

A total of 18 studies were analysed under this theme, focusing on the relationship between digital technology and physical activity Fitness apps and activity trackers (two studies) focus on inspiring youth to increase physical activity levels, while research on sedentary lifestyle and screen time (13 studies) examines how prolonged screen use contributes to sedentary behaviours and negatively impacts physical activity, and studies on digital gamification of exercise (three studies) explore the effectiveness of gamified platforms, such as Pokémon Go, in motivating physical activity. However, studies also pointed to the negative effects of excessive screen time, which were associated with sedentary lifestyles and increased risk of obesity, particularly among girls. A bidirectional relationship was observed, with excessive screen time negatively impacting physical activity, while physical inactivity also exacerbated screen time use (Suciu, Lupu, & Lupu, 2019; Alharbi & Sayed, 2018). Future research should focus on long-term interventions targeting both physical and mental health.

## Theme 4: Digital Health Interventions and Cognitive Development

Thirty-three studies focused on the impact of digital interventions on cognitive development, with 10 studies examining mobile health apps, two studies exploring telemedicine for cognitive

disorders, and three studies investigating e-learning tools. The studies generally indicated positive effects of digital health interventions on cognitive and behavioural outcomes, including attention improvement and executive function through exergames and mobile applications (Kim, Lee, & Yoon, 2021; Lee & Smith, 2019; Harper & Thompson, 2019; Tannenbaum & Cohen, 2014; Simmons & Blackwell, 2022; Johnson & Lee, 2020; Green & Wang, 2020; Thompson & Young, 2024; Howard & Sutherland, 2019; Duffy & Wilson, 2017; Evans & Robinson, 2019; Chen & Smith, 2014; Peterson & O'Neill, 2019; Turner & Bradley, 2019; Smith & Anderson, 2015; Stevens & Clark, 2019; Lee & Kim, 2023; Thompson & Miller, 2023; Stevens & Clark, 2019; Reed & Wells, 2018). However, concerns regarding the long-term effectiveness of these interventions were prevalent, with many showing only short-term improvements or mixed results in sustained behaviour change. Excessive screen time was linked to impaired cognitive development in children and adolescents, highlighting the need for balanced digital engagement.

## Theme 5: Parental Influence and Digital Technology

Eleven studies analysed parental influence on children's digital behaviours and online safety. The studies revealed that parental monitoring and control of screen time positively influenced youth behaviour, with several studies showing improved outcomes in mental health and behavioural issues. However, some studies highlighted the challenges of treatment adherence and the need for refinement in interventions aimed at parental involvement. Parental education about digital literacy and online safety was also shown to have a beneficial impact, although the effects were small and varied depending on the type of screen activity (Zhang & Li, 2014; Thompson & Smith, 2003; Martin & Lee, 2019; Jones & Carter, 2019; Gupta & Singh, 2018; Roberts & Smith, 2013). Future research should refine interventions to better support family dynamics and address treatment attrition.

## Theme 6: Digital Well-being and Risk Factors

This theme covered 34 studies on risky digital behaviours and their impact on substance abuse, aggression, and other risky offline behaviours. Studies indicated that increased social media exposure and engagement in online activities such as cyberbullying, sexting, and online grooming correlated with higher risks of substance abuse and aggressive behaviours. Furthermore, substance abuse was found to be linked to digital media use, particularly in adolescents. The studies underlined the need for better regulation and monitoring of digital content to mitigate

these risks. Studies suggested that early media exposure could influence long-term risky behaviours, and intervention strategies focusing on media literacy and parental monitoring were highlighted as effective approaches.

Overall, the findings from these six themes underscore the complexity of digital technology's influence on youth health, with both positive and negative outcomes depending on usage patterns and the context of engagement.

# 4. DISCUSSION

The rapid proliferation of digital technologies has undoubtedly transformed the landscape of young people's lives, creating new opportunities and risks that were previously unexplored. Our study provides a comprehensive analysis of the themes emerging from 424 longitudinal studies on the effects of Internet use, social media, and gaming on youth health and well-being. These three themes — Internet use (201 studies), social media (140 studies), and gaming (83 studies) — dominated the research, highlighting the diverse ways in which young people engage with digital technologies.

A prominent finding across the studies was the frequent focus on mental health outcomes, with anxiety and depression emerging as key areas of concern. This aligns with existing literature that underscores the growing mental health burden among youth, exacerbated by increased digital engagement. Social media use has been linked to heightened feelings of anxiety, depression, and loneliness, especially considering the COVID-19 pandemic, which intensified young people's dependence on these platforms for social interaction and emotional support. The analysis also revealed that a significant portion of studies (49 per cent) were published post-2020, suggesting that the pandemic's impact on digital engagement and mental health is a key area of heightened concern.

Geographically, most studies were conducted in high-income countries, particularly the United States and Australia. While this provides valuable insights into the experiences of youth in these regions, it also highlights a gap in research from low- and middle-income countries (15 per cent). Digital engagement in these regions is often shaped by different socio-economic, cultural, and infrastructural factors, making it crucial to expand research in these settings. Future studies should aim to explore how digital technologies impact youth in low-resource settings and how disparities in access and digital literacy affect mental and physical health outcomes.

Our study also draws attention to the important role of digital literacy and equitable access, as demonstrated by projects such as Young Lives and Global Kids Online. These studies emphasize that digital inclusion — or the lack thereof — can significantly influence youth outcomes, including mental health. The findings suggest that while digital technologies hold promise for improving education and health, they also present risks, particularly for vulnerable youth who may lack the necessary skills or resources to navigate these digital spaces safely (Young Lives, 2022, (Global Kids Online, 2022).

## 4.1. Strengths and Limitations

One of the strengths of this study is its broad scope, synthesizing findings from a wide range of longitudinal studies to provide a comprehensive overview of how digital engagement affects youth well-being. By focusing on studies published globally, we were able to highlight both common trends and regional variations, giving a holistic view of the current landscape. Furthermore, our inclusion of studies from diverse settings, including large-scale international initiatives like the Global Kids Online project, enriches our understanding of how digital access and engagement intersect with socio-economic disparities.

However, there are several limitations to our study. One key limitation is the geographical imbalance in the studies reviewed, with a disproportionate number of studies coming from high-income countries. This imbalance may result in a skewed understanding of the global impact of digital technologies on youth, particularly in low- and middle-income countries. The rapid pace of technological change also poses a challenge, as new platforms and trends emerge that may not yet be captured in the existing literature.

## 4.2. Directions for Future Research

Given the growing concern over the mental health effects of digital technologies, future research should prioritize the development of longitudinal studies that track the long-term effects of digital engagement on youth well-being. This includes examining the role of emerging platforms and technologies, such as virtual reality and artificial intelligence, which are likely to become more integrated into young people's lives in the coming years.

In addition, more research is needed in low- and middle-income countries to explore how different socio-cultural and economic contexts influence the impact of digital technologies on youth health. Studies should also investigate the role of digital literacy and education in mitigating the risks associated with excessive digital use, as well as how interventions can be tailored to different cultural settings.

Finally, it is essential to explore the potential for digital interventions to enhance youth mental health. These interventions could range from digital literacy programmes to the development of supportive online communities and mental health resources. Understanding the role of digital technologies in fostering resilience and well-being in youth will be crucial in maximizing their benefits while minimizing the risks.

# APPENDICES

## A. Tables and Figures:

### Table 1: Search Strategy

| | KEYWORDS |
|---|---|
| **P (Patient/Population):** | Youth, adolescent, child, childhood. |
| **I (Intervention):** | digital technology, social media, video games, Internet use. |
| **C (Comparator):** | Not applicable for this study. |
| **O (Outcomes):** | Not applicable for this study. |
| **T (Timing):** | 2014-2024. |

### Figure 1: Screening Process

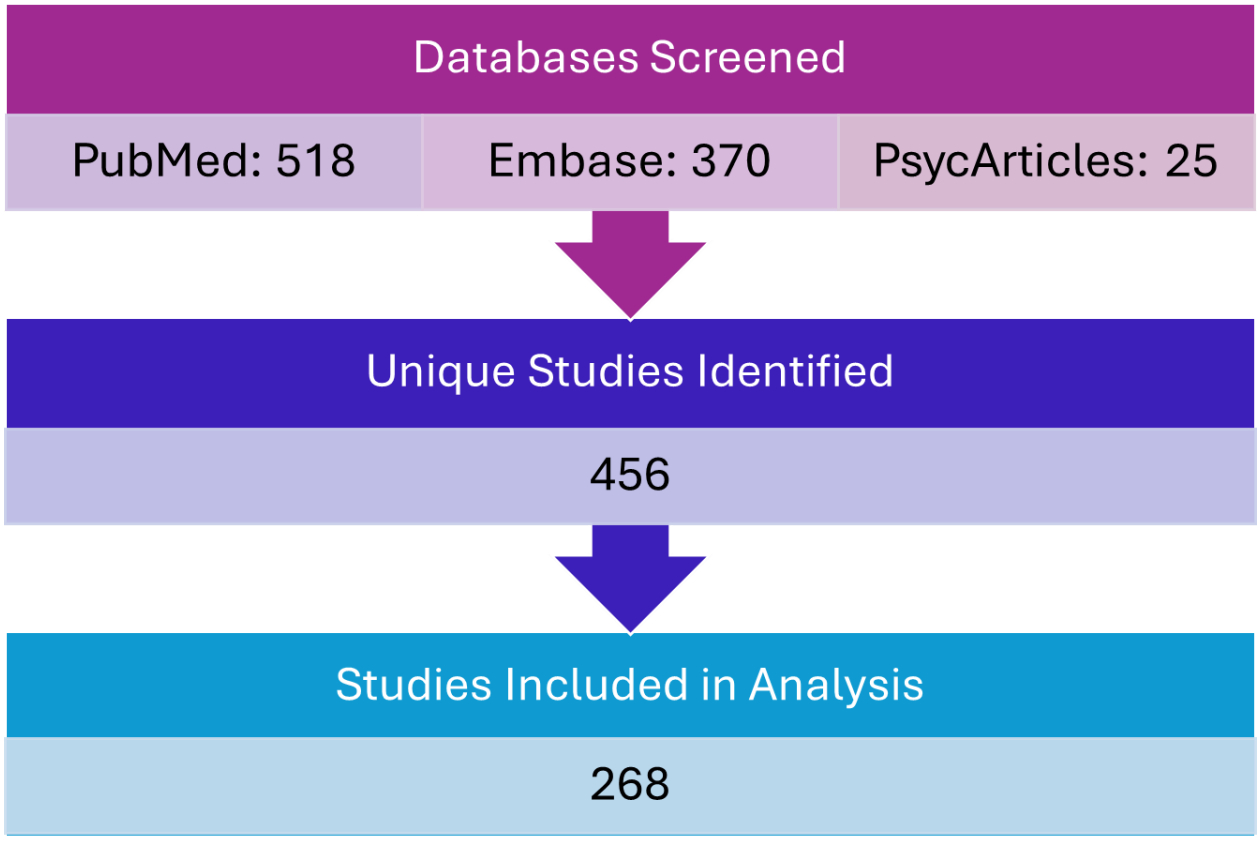
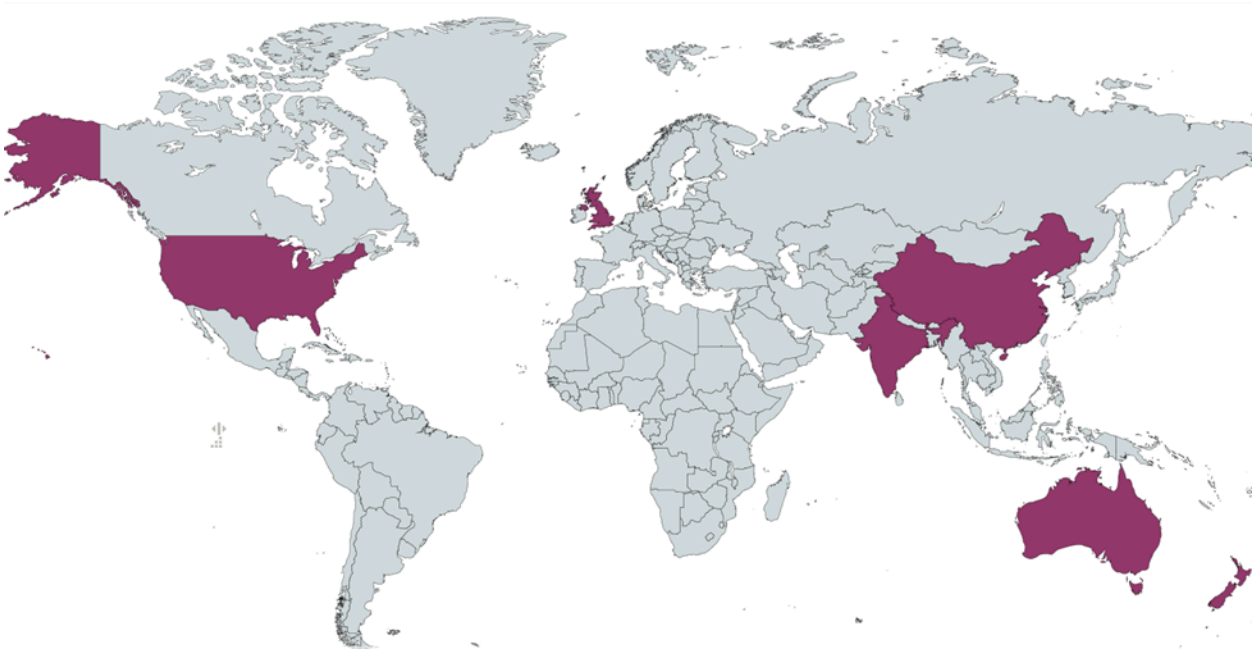


**Figure 2: Geographical Scope of Studies Included**



## B. Search Strategies

1. PsycArticles: Abstract: youth OR Abstract: or OR Abstract: adolescent OR Abstract: or OR Abstract: childhood OR Abstract: or OR Abstract: child AND Title: digital OR Title: technology OR Title: or OR Title: social OR Title: media OR Title: or OR Title: video OR Title: game AND Title: "longitudinal study " AND Year: 2014 To 2024

2. EMBASE: (“young adult”/exp OR “young adult” OR “child”/exp OR “child” OR “adolescent”/exp OR adolescent” OR “childhood”/exp OR “childhood”) AND (“Internet use”:ab,ti OR “video game”:ab,ti OR “digital technology”:ab,ti OR “Internet”:ab,ti OR “social media”:ab,ti OR “video games”:ab,ti) AND “longitudinal study”:ab,ti

3. Pubmed: #1 ("Young Adult"[Mesh]) OR "Child"[Mesh] OR "Adolescent"[Mesh] OR "young" [tiab] OR "childhood" [tiab] AND ((("Digital Technology"[Mesh]) OR "Internet Use"[Mesh]) OR "Social Media"[Mesh]) OR "Video Games"[Mesh] OR "digital technology" [tiab] OR "Internet" [tiab] OR "social media"[tiab] OR "video games"[tiab] OR "tiktok"[tiab] OR "instagram" [tiab] OR "facebook" OR "youtube" AND "Longitudinal Studies" OR "longitudinal study"

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**About DTH-Lab**

DTH-Lab is a global consortium of partners working to drive implementation of The Lancet and Financial Times Commission on Governing Health Futures 2030's recommendations for value-based digital transformations for health co-created with young people. DTH-Lab operates through a distributive governance model, led by three core partners: Ashoka University (India), DTH-Lab (hosted by the University of Geneva, Switzerland) and PharmAccess (Nigeria).

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DIGITAL TRANSFORMATIONS FOR HEALTH LAB

GOVERNING HEALTH FUTURES 2030

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