

Article

Quality Analysis of YouTube-Based Exercise Programs for Typically Developing Children: Content Analysis

Juntaek Hong ¹, Yerim Do ¹, Dong-wook Rha ¹ and Na Young Kim ^{2,3,*}

¹ Department and Research Institute of Rehabilitation Medicine, Yonsei University College of Medicine, Seoul 03722, Republic of Korea; ghdwnsxor@yuhs.ac (J.H.); doyr62@yuhs.ac (Y.D.); medicus@yonsei.ac.kr (D.-w.R.)

² Department of Rehabilitation Medicine, Yongin Severance Hospital, Yonsei University College of Medicine, Yongin 16995, Republic of Korea

³ Center for Digital Health, Yongin Severance Hospital, Yonsei University College of Medicine, Yongin 16995, Republic of Korea

* Correspondence: kny8452@yuhs.ac; Tel.: +82-10-9127-4482

Abstract: Background: Physical activities in childhood are important. However, a lack of exercise among children and adolescents is becoming a global reality. Moreover, following the coronavirus disease 2019 pandemic, the increase in time spent at home has led to qualitative changes, such as at-home exercises and the use of YouTube content. This study aimed to conduct qualitative assessments of YouTube-based exercise education programs, such as video content and exercise education programs. **Methods:** A Python-based (version 3.11.6) video data crawl of YouTube using the keywords “children + exercise”, “kid + exercise”, “child + physical activity”, and “kid + physical activity” was conducted on 27 November 2023. Duplicate, non-English, outdated (over 5 years old), short (<60 s) or long (>30 min) videos, and irrelevant content were excluded. Basic video characteristics, video popularity metrics, and qualitative analyses (m-DISCERN, QQS, i-CONTENT, CONTENT, CERT) were collected and assessed. **Results:** Of the 2936 retrieved videos, 126 were selected. Approximately 10% of the videos were uploaded by health professionals, and most videos covered aerobic and muscle-strengthening exercises. A qualitative analysis of the video content showed moderate to high quality, while only a few videos satisfied the criteria of an effective exercise program, especially in terms of “Type and timing of outcome assessment”, “Qualified supervisor”, “Patient eligibility”, “Adherence to the exercise program”, and “Dosage parameters (frequency, intensity, time)”. In the correlation analysis of video content and exercise program quality, only a few items showed a statistically significant correlation. **Conclusions:** YouTube exercise-related educational content targeting children may be inadequate and is not correlated with video popularity. Although an overall weak to moderate correlation was observed between the quality evaluation of exercise education and video content, the use of video quality assessment tools to evaluate exercise program quality was insufficient.

Keywords: YouTube; child; exercise program; usability; video quality



Academic Editor: Daniele Giansanti

Received: 10 February 2025

Revised: 3 March 2025

Accepted: 3 March 2025

Published: 5 March 2025

Citation: Hong, J.; Do, Y.; Rha, D.-w.; Kim, N.Y. Quality Analysis of YouTube-Based Exercise Programs for Typically Developing Children: Content Analysis. *Healthcare* **2025**, *13*, 560. <https://doi.org/10.3390/healthcare13050560>

Copyright: © 2025 by the authors.

Licensee MDPI, Basel, Switzerland.

This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license

(<https://creativecommons.org/licenses/by/4.0/>).

1. Introduction

The importance of physical activity during childhood cannot be overemphasized. Maintaining optimal exercise levels during childhood and adolescence reduces cardiometabolic risk and promotes bone density and growth [1]. Moreover, it is known to have positive effects not only on physical health but also on cognitive function and

mental health [2]. In the long term, physical activity during childhood is closely related to that during adolescence and adulthood [3].

Given the importance of physical activity behavior, the American College of Sports Medicine guidelines strongly recommend performing exercise for more than 1 h, three to five times per week [4]. However, the lack of exercise among children and adolescents is becoming a global issue. According to the previous study based on self-report data, about 80% of 11–17-year-olds were physically inactive [5]. Additionally, accelerometry data from American and European youth aged 10–24 revealed a sharper decline in physical activity as adolescents aged [6]. Along with this trend, the mean BMI and obesity rates in children and adolescents aged 5–19 years have increased in most regions and countries, highlighting the urgent need for well-structured strategies to promote physical activity behaviors in children and adolescents [7].

Meanwhile, following the onset of the coronavirus disease 2019 (COVID-19) pandemic, discernible shifts were observed in the qualitative and quantitative dimensions of physical activity trends for children, reflecting an increase in screen time at home and a decrease in spontaneous outdoor activities [8]. Correspondingly, YouTube-based fitness content has garnered significant attention. However, there are some concerns about their clinical effectiveness [9].

There have been several prior studies of the effects of web-based exercise programs, including YouTube content; however, their clinical efficacy remains controversial [10,11]. Unlike offline educational programs, no previous study has evaluated the qualitative aspects of web-based exercise programs. With digital tools becoming common in education, considering their potential impact on children's health, evaluating the quality of such information is essential. Consequently, this study aimed to perform a comprehensive qualitative and quantitative analysis of YouTube-based educational exercise content for children, including an analysis of the association between video content quality and educational program quality.

2. Methods

2.1. Study Design and Video Selection Strategy

YouTube was scoured for relevant content on 27 November 2023 using general terms that were easily searched, even for individuals with limited knowledge of types of exercises, as follows: “children + exercise”, “kid + exercise”, “child + physical activity”, and “kid + physical activity”. Videos were selected using a Python-based crawling technique (version 3.11.6) with specific keywords and criteria to ensure the inclusion of all available videos. The exclusion criteria were as follows: duplicate and non-English-language videos uploaded more than 5 years before the search date, based on the criteria of previous studies [12]; play time < 60 s to exclude short-form videos inappropriate for information delivery purposes [13] or >30 min, which were used as exclusion criteria in previous studies targeting in-depth information [14,15]; and inappropriate content on exercise and physical activities from an educational perspective, such as videos lacking audio for the purpose of imparting knowledge, consisting solely of raw footage or photographs without explanations, or created for advertising purposes. Videos deemed inappropriate by the researchers were also omitted. Figure 1 shows the video selection process, while Table S1 lists the specific reasons for excluding each video. Our study exclusively utilized publicly available online videos, with no direct interaction involving humans or animals, and no collection or use of personally identifiable information. Hence, approval from an ethical committee was not necessary.

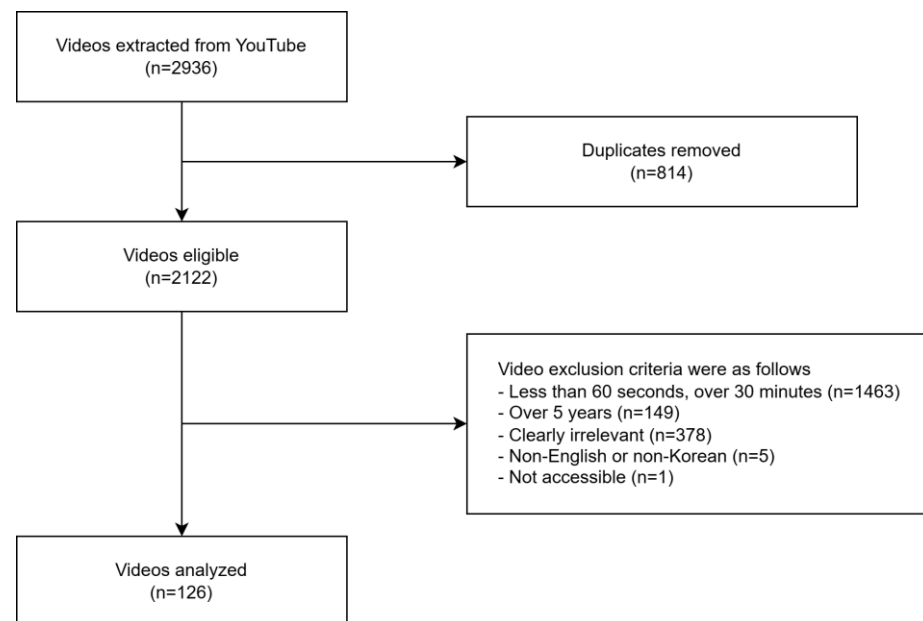


Figure 1. Flowchart demonstrating video selection process.

2.2. Video Assessment

The basic characteristics of each video, including title, uniform resource locator, uploader, upload date, and exercise type, were collected. The classification of exercise types adhered to the recommendations outlined in the Physical Activity Guidelines for Americans [4], distinguishing between aerobic and strength-training exercises. Videos featuring both types of exercises were categorized as “multicomponent”, whereas those not aligned with either were classified as “other”. Furthermore, two researchers (JH and YD), each with over 5 years of extensive experience in physical exercise and pediatric rehabilitation, conducted a comprehensive assessment of the videos across three domains: video popularity-related parameters, qualitative assessment tools of video content, and exercise programs. The researchers resolved discrepancies through discussion and consensus.

2.3. Quantitative Information and Video Popularity-Related Parameters

Quantitative data pertaining to the video content, including playtime, number of likes, dislikes, and total views, were gathered. Using this information, the Video Power Index (VPI) was computed as a metric of video popularity. This index is derived by dividing the product of the like-to-view ratio by 100. The like-to-view ratios were calculated as follows: $(\text{number of likes} \times 100) / (\text{total number of likes and dislikes})$ and $(\text{number of total views} / \text{days since upload})$ [12].

2.4. Quality Assessment Tools

This study conducted a qualitative analysis from two perspectives: video content quality and exercise program quality. All the assessment tools used in this study were either developed through expert consensus in the relevant field [16], including the Delphi method [17,18], or selected from tools that have been widely used in video content quality analysis across numerous previous studies as below.

2.4.1. Video Content Quality

A quality assessment of the video content was conducted using the modified DISCERN (m-DISCERN) tool and the global quality scale (GQS) [19,20]. The m-DISCERN, a widely used evaluation index for assessing video content reliability, comprises five items rated on a binary scale. A higher score indicates greater reliability, with a threshold of ≥ 3 out of a

maximum score of 5 indicating significant reliability [21]. Furthermore, the overall video quality was appraised using the 5-point GQS, which was designed to assess the quality and flow of online information [22]. Overall ratings of 4–5 points were designated as high, 3 points as moderate, and 1–2 points as low quality [23]. Moreover, to clarify the scores obtained for each quality and flow section, each section was divided into poor, moderate, and good groups based on the GQS score criteria.

2.4.2. Exercise Program Quality

The quality assessment of the exercise programs used the International CONsensus on Therapeutic Exercise aNd Training (i-CONTENT) tool [24], CONsensus on Therapeutic Exercise aNd Training (CONTENT) scale, and Consensus on Exercise Reporting Template (CERT) [25]. The i-CONTENT tool comprises seven items assessed on a binary scale. The scores obtained from this tool facilitate classification into low, moderate, and high risk of ineffectiveness categories [26]. The CONTENT scale comprises a total of nine items categorized into five sections aimed at evaluating the therapeutic validity of the exercise. Each section was assessed using a binary scoring system; a score of ≥ 6 out of 9 indicates high therapeutic quality [27]. In contrast, the CERT is a semiquantitative scoring tool that assesses the completeness of exercise descriptions using 16 binary items, with higher scores indicating more comprehensive content [28].

2.5. Statistical Analysis

Descriptive data are shown as numbers, percentages, medians, and interquartile ranges. The Shapiro–Wilk test was used to assess the normality of the data distribution. Cochran’s Q and McNemar’s tests were performed to compare the differences between the proportions of items, and a Bonferroni test was used for multiple-comparison correction. Pearson’s correlation analysis was conducted to examine the association among the assessments. Cohen’s weighted kappa or Spearman’s rank correlation analysis was used to assess the strength and direction of the relationship between the binary nominal or ordinal categorical data. The scales of the two coefficients were based on the ranges presented previously [29,30]. Statistical significance was set at $p < 0.05$, and all analyses were performed using the RStudio software (R version 4.1.3).

3. Results

3.1. General Characteristics and Quantitative Analysis of Video Content

Out of the 2936 videos via YouTube search, 126 met the inclusion criteria after applying exclusions (Figure 1). The basic characteristics of the videos are listed in Table 1. Only 10.31% of the videos were uploaded by health professionals who confirmed their affiliation with and possession of a health-related certificate. The largest proportion of exercise type was multicomponent exercise (84.13%). A detailed classification of exercise types is provided in Table S2.

Table 1. Basic characteristics and quantitative analysis of video contents.

Variables	Value
Total videos (n)	126
Health professional uploader	13 (10.31)
Exercise type	
Aerobic	4 (3.17)
Bone and muscle strengthening	9 (7.14)
Multicomponent physical activity	106 (84.13)
Other	7 (5.56)
Video duration	813.50 $\pm$ 411.37

Table 1. Cont.

Variables	Value
Likes	315.50 (58.25–4276.00)
Dislikes	9.00 (0.00–405.8)
Views	54,640 (7324–599,011)
VPI	252.00 (31.25–826.25)

Values are shown as number (percentage), mean $\pm$ standard deviation, or median (IQR1–IQR3). Abbreviations: IQR, interquartile range; VPI, Video Power Index.

3.2. Qualitative Assessment of Video Content

Table 2 summarizes the results of the quality analysis of the video content. For the classification of m-DISCERN based on the obtained scores, 81.75% were classified as “reliable”. For m-DISCERN, the uncertainty (“Are areas of uncertainty mentioned?”) and reliability (“Are reliable sources of information used?”) items were satisfied by >80% of the video contents, while the items about the aim of the video contents (“Are the aims clear and achieved?”) and presence of additional information (“Are additional sources of information listed for patient reference?”) were satisfied by 60–70% of all video contents. However, the balance item (“Is the information presented both balanced and unbiased?”) was satisfied by <20%, a value that was significantly lower than the other items ($p < 0.001$) (Figure 2a).

Table 2. Quality analysis of video contents.

Evaluation Tool	Value
m-DISCERN total score	3.28 $\pm$ 1.01
Unreliable	23 (18.25)
Reliable	103 (81.75)
GQS total score	3.29 $\pm$ 1.01
High	30 (23.80)
Moderate	53 (42.06)
Low	43 (34.12)

Values are shown as number (percentage) or mean $\pm$ standard deviation. Abbreviations: m-DISCERN, modified DISCERN; GQS, global quality scale.

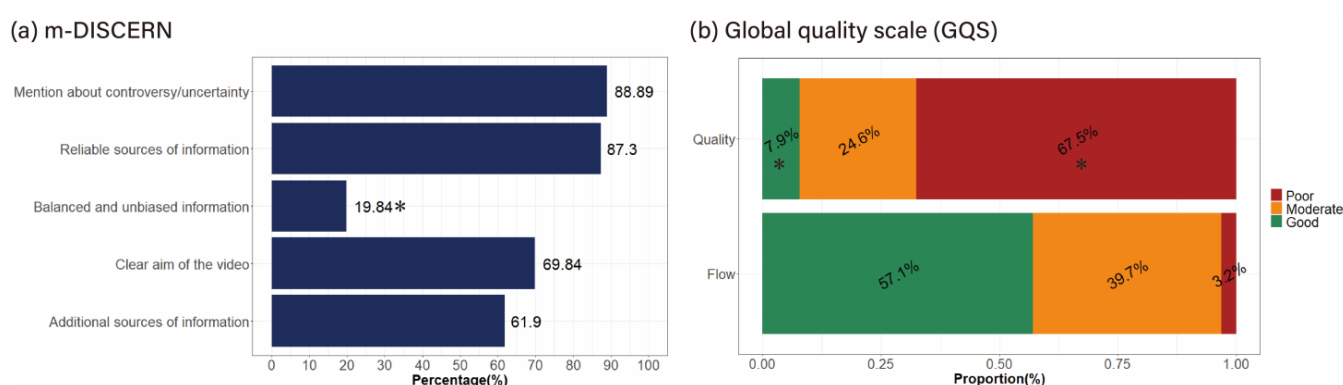


Figure 2. Satisfaction analysis between items of quality assessment tools of video content. Data were analyzed using McNemar test, and Bonferroni test was used for multiple-comparison correction. * $p < 0.001$. Abbreviation: m-DISCERN, modified DISCERN; GQS, global quality scale.

The mean GQS score was 3.29 ± 1.01 (maximum 5), indicating quality and flow between the moderate/suboptimal (GQS score of 3) and good (GQS score of 4). For the classification of GQS based on the total scores obtained, contents classified as high, moderate, and low quality accounted for 23.80%, 42.06%, and 34.12%, respectively. The analysis

of video content flow and quality revealed a significantly higher proportion of “good quality” than “good flow” (57.1% vs. 7.9%, respectively; $p < 0.001$). In contrast, “poor flow” showed a statistically significantly higher proportion than “poor quality” (67.5% vs. 3.2%, respectively; $p < 0.001$) (Figure 2b).

3.3. Qualitative Assessment of Exercise Program

Table 3 summarizes the results of the quality analyses of the exercise programs. The mean i-CONTENT, CONTENT, and CERT scores were 2.62 ± 0.77 (of 7), 1.53 ± 1.25 (of 9), and 4.50 ± 2.36 (of 19), respectively. For the quality classification, according to i-CONTENT, not a single video fell into the “low risk of ineffectiveness” category, while the vast majority, 93.65%, belonged to the “high risk of ineffectiveness” category. Similarly, according to CONTENT, 98.41% of the videos were classified as “ineffective”.

Table 3. Results of quality analysis of educational programs.

Evaluation Tool	Value
i-CONTENT total score	2.62 ± 0.77
Low risk of ineffectiveness	0 (0)
Moderate risk of ineffectiveness	8 (6.35)
High risk of ineffectiveness	118 (93.65)
CONTENT total score	1.53 ± 1.25
Effective	2 (1.6)
Ineffective	124 (98.41)
CERT total score	4.50 ± 2.36

Values are shown as number (percentage) or mean $\pm$ standard deviation. Abbreviations: i-CONTENT, International CONsensus on Therapeutic Exercise aNd Training; CONTENT, CONsensus on Therapeutic Exercise aNd Training; CERT, Consensus on Exercise Reporting Template.

In the i-CONTENT subcategory analysis, none of the videos’ contents were satisfactory in the categories of “Qualified supervisor” or “Type and timing of outcome assessment”. Moreover, the items “Patient selection” (10.32%; $p < 0.001$) and “Adherence to the exercise program” (3.97%; $p < 0.001$) showed statistically significantly lower proportions than the other three items (Figure 3a). The items “Dosage parameters (frequency, intensity, time)”, “Type of exercise”, and “Safety of the exercise program” were satisfied by approximately 89.68%, 69.84%, and 88.1%, respectively.

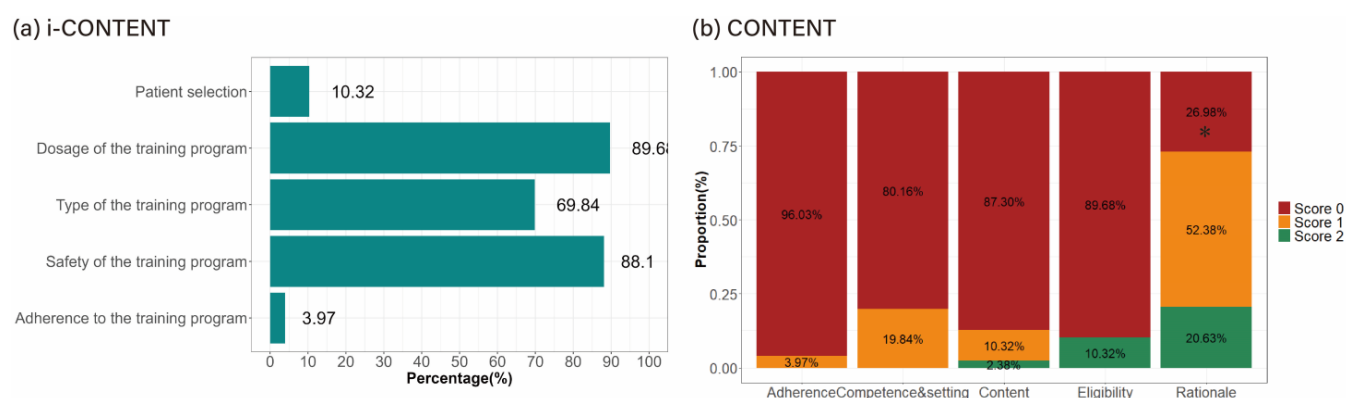


Figure 3. Satisfaction analysis among items of quality assessment tools of exercise program. Data were analyzed using McNemar test, and Bonferroni test was used for multiple-comparison correction. * $p < 0.001$. Abbreviation: i-CONTENT, International CONsensus on Therapeutic Exercise aNd Training; CONTENT, CONsensus on Therapeutic Exercise aNd Training.

For CONTENT, “Rationale” (73.01%) was the only section that achieved 50% satisfaction with at least one item; this proportion was significantly higher than those of the other

four sections ($p < 0.001$) of “Patient eligibility”, “Competences and setting”, “Content”, and “Adherence” at 10.32%, 19.84%, 12.70%, and 3.97%, respectively (Figure 3b).

3.4. Correlation Study of Analyses

3.4.1. Quantitative Assessment of Video Content and Other Qualitative Assessments

Qualitative parameters related to the video content and exercise education programs did not show any statistical correlation with the quantitative parameters of the video content. In particular, no statistically significant association was observed with VPI, the parameter most closely related to popularity (Table 4).

Table 4. Correlation results of video popularity and qualitative assessments for video content and exercise education.

Variable/Tool		Quantitative Assessment				
		Like	Dislike	View Ratio	View	VPI
Video content quality	m-DISCERN	0.05	0.07	0.08	0.07	0.07
	GQS	−0.06	−0.12	0.07	−0.03	0.05
Exercise program quality	i-CONTENT	−0.01	−0.1	0.05	−0.01	0.09
	CONTENT	0.03	0.05	0.02	0.04	0.04
	CERT	0.07	0.07	0.06	0.09	0.06

A Pearson correlation analysis was used to derive these data. Abbreviation: m-DISCERN, modified DISCERN; GQS, global quality scale; i-CONTENT, International CONsensus on Therapeutic Exercise aNd Training; CONTENT, CONsensus on Therapeutic Exercise aNd Training; CERT, Consensus on Exercise Reporting Template; VPI, Video Power Index.

3.4.2. Comparison of Qualitative Assessments

Statistical analysis found a moderate correlation between m-DISCERN scores and all exercise education assessment tools (ρ : i-CONTENT, 0.48; CONTENT, 0.46; and CERT, 0.49), whereas GQS scores showed only a weak positive correlation with CONTENT ($\rho = 0.31$) and CERT ($\rho = 0.31$) and no significant link with i-CONTENT ($\rho = 0.16$) (Figure 4).

Figure 5 shows the correlation between the qualitative assessment items of the exercise program and video content. In the correlation analysis between items of m-DISCERN for video quality and those of i-CONTENT and CONTENT for exercise program quality, only two from i-CONTENT and three from CONTENT showed statistically significant correlations with those of m-DISCERN. For items that showed statistical correlations, “Safety of the exercise program” for i-CONTENT showed almost perfect agreement with the uncertainty item (“Are areas of uncertainty mentioned?”) ($\kappa = 0.96$) and moderate agreement with the reliability item (“Are reliable sources of information used?”) ($\kappa = 0.45$) for m-DISCERN. Moreover, the balance item (“Is the information presented both balanced and unbiased?”) for m-DISCERN showed a very high correlation with “Competences and setting” for CONTENT ($\rho = 1.00$). “Clear aim of the video” for m-DISCERN also showed almost perfect agreement with “Type of the exercise program” for CONTENT ($\kappa = 0.81$) and a very high correlation with “Rationale” for CONTENT ($\rho = 0.81$). In the correlation analysis between items on the GQS for video quality and two exercise program quality evaluation tools, all items for i-CONTENT showed no significant correlation with GQS sections, while only two items for CONTENT, “Competences and setting” ($\rho = 0.55$) and “Content” ($\rho = 0.51$), showed moderate correlations with the flow section of the GQS.

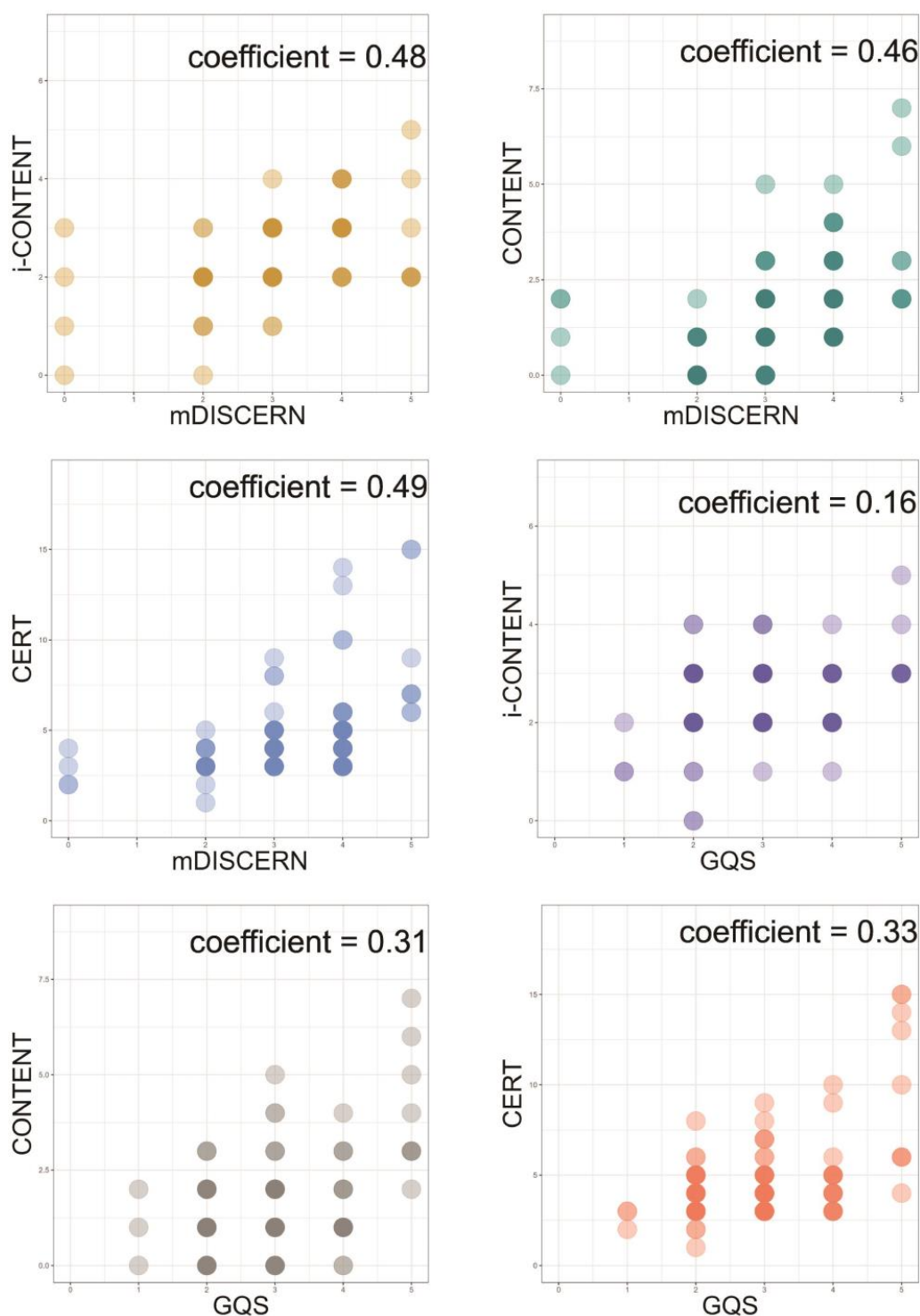


Figure 4. Correlation plot for qualitative assessment between exercise program and video content. Spearman rank correlation analysis was used in this figure. Abbreviation: m-DISCERN, modified DISCERN; GQS, global quality scale; i-CONTENT, International Consensus on Therapeutic Exercise aNd Training; CONTENT, Consensus on Therapeutic Exercise aNd Training; CERT, Consensus on Exercise Reporting Template.

	i-CONTENT					CONTENT					
Mention about controversy/uncertainty'	-0.03 ^a	0.29 ^a	0.03 ^a	0.96 ^{a***}	-0.01 ^a	-0.13 ^b	-0.27 ^b	0.15 ^b	-0.24 ^b	-0.06 ^b	m-DISCERN
Additional sources of information	0.05 ^a	-0.08 ^a	0.16 ^a	0.09 ^a	0.05 ^a	0.10 ^b	0.23 ^b	0.10 ^b	0.25 ^b	0.16 ^b	
Balanced and unbiased information	0.15 ^a	-0.12 ^a	-0.09 ^a	-0.11 ^a	0.29 ^a	0.16 ^b	1.00 ^{b†††}	-0.16 ^b	0.30 ^b	0.40 ^{b†}	
Reliable sources of information	-0.03 ^a	0.26 ^a	0.10 ^a	0.45 ^{a*}	0.01 ^a	-0.11 ^b	-0.23 ^b	0.18 ^b	-0.28 ^b	0.08 ^b	
Clear aim of the video	-0.07 ^a	0.00 ^a	0.81 ^{a***}	0.16 ^a	0.01 ^a	-0.18 ^b	-0.15 ^b	0.81 ^{b†}	0.15 ^b	0.04 ^{b††}	
Flow	-0.01 ^b	-0.14 ^b	-0.02 ^b	-0.16 ^b	0.34 ^b	-0.01 ^b	0.55 ^{b†}	-0.03 ^b	0.51 ^{b†}	0.35 ^b	GQS
Quality	-0.03 ^b	0.36 ^b	0.15 ^b	0.29 ^b	0.10 ^b	-0.03 ^b	0.08 ^b	0.20 ^b	0.17 ^b	0.10 ^b	
	Patient selection	Dosage of the training program	Types of the training program	Safety	Adherence	Patient eligibility	Competence and setting	Rationale	Content	Adherence	

Figure 5. Heatmap for qualitative assessment between exercise program and video content. ^a Cohen's kappa coefficient, ^b Spearman rank correlation coefficient, [†] moderate correlation in Spearman rank correlation analysis, ^{††} high correlation in Spearman rank correlation analysis, ^{†††} almost perfect correlation in Spearman rank correlation analysis, ^{*} moderate agreement in Cohen's kappa coefficient, and ^{***} almost perfect agreement in Cohen's kappa coefficient. Abbreviation: m-DISCERN, modified DISCERN; GQS, global quality scale; i-CONTENT, International CONsensus on Therapeutic Exercise aNd Training; CONTENT, CONsensus on Therapeutic Exercise aNd Training.

4. Discussion

4.1. Principal Results

To the best of our knowledge, this research provides the first comprehensive qualitative and quantitative assessment of YouTube-based educational exercise content for children, including an analysis of the statistical relationships between video content quality and educational program quality. There was a lack of uploader information, which affected reliability, along with challenges in analyzing exercise types due to the combination of muscle strengthening and aerobic exercises in most of the included content. Previous studies have shown that expert-provided videos had higher reliability and quality [31,32], indicating the need for more professional health provider involvement in pediatric physical education content.

The qualitative analysis of video content revealed moderate quality and suboptimal flow. However, the balance item for m-DISCERN and the quality-related section of the GQS showed significantly lower satisfaction levels than the other items. This phenomenon may be influenced by the inherent nature of YouTube video content, in which important information must be delivered in a short time to gain popularity. Additional efforts, such as the use of YouTube scripts, could be needed to access relevant information.

In the qualitative analysis of the exercise education program, no videos met items for i-CONTENT about the outcome assessment and presence of a qualified supervisor,

and adherence-related items for i-CONTENT and CONTENT scored less than 5%. These areas have consistently been challenging for non-face-to-face education content, as noted previously [9,33]. Considering the nature of pediatric physical education content, it is common for supervisors to be parents. Therefore, incorporating explanations specifically directed at parents would further enhance the educational value of the content.

Low scores for the patient selection and eligibility-related items for i-CONTENT and CONTENT were attributed to the lack of information on target age groups. Consequently, the lack of age-related information led to lower scores for the “Competences and setting” item for CONTENT. On the other hand, high scores were obtained for the “Dosage parameters (frequency, intensity, time)”, “Type of exercise”, and “Safety of the exercise program” items of i-CONTENT and the “Rationale” item of CONTENT. However, the “Content” item of CONTENT received a low satisfaction rating. This suggests that while the general information about exercise such as purpose and method, type, and potential complications were clearly mentioned, there was a lack of individualized exercise options, which showed similar results to the previous study about home exercises [34]. To address these limitations, recent studies have explored digital adherence technologies [35,36], wearable sensors designed for physical performance monitoring [37], app-based interfaces [38,39], and hybrid models [40] to improve adherence and personalize exercise programs. In particular, based on prior research on the positive effects of social media exercise content, it offers unique advantages that conventional exercise education programs cannot replicate, such as strong initial engagement through experience sharing or the influencer effect [41], easy accessibility, a wide variety of exercise options [42], and a sense of accountability through social feedback [43]. It is expected that a detailed strategy incorporating these strengths could address the limitations identified in this study.

The correlation analysis of the total scores of the quantitative evaluation tools for video content and other qualitative evaluation tools showed no statistically significant correlations. This finding suggests no correlation between video popularity and the qualitative aspects of video content or exercise education programs, which is consistent with previous quality analyses of YouTube-based content [32,44]. In the correlation analysis of the total scores of video quality and the exercise education program tools, a moderate correlation was observed, which could be explained by the extensive research on the impact of multimedia components on educational outcomes [45]. However, no significant correlation was observed for the scores of GQS, which reflects overall satisfaction with flow and quality; however, the significant difference in the satisfaction ratios between the two sections of this study could have influenced the results.

The correlation analysis between two qualitative assessment tools revealed that video information about uncertainty and reliability (m-DISCERN) affects exercise program safety (i-CONTENT). Additionally, the aims of the videos (m-DISCERN) were strongly correlated with the type (i-CONTENT) and rationale (CONTENT) of the exercise program. Furthermore, purpose-specific detailed exercise education content (CONTENT) was strongly related to information balance (m-DISCERN) and moderately related to video flow (GQS). However, the satisfaction rates of all items mentioned in this paragraph were below 20%, and the remaining items showed no significant correlations among them, indicating that video quality tools may not effectively assess exercise program quality, particularly in relation to eligibility, dosage, and adherence.

4.2. Limitations

This study has several strengths and limitations. One strength is its focus on the qualitative analysis of YouTube-based educational exercise programs, providing valuable insights into the content and structure of digital educational tools for children. However, a

limitation of this study is that video popularity may have been influenced by the potential manipulation of view counts through certain applications, and the study design lacked an analysis of their clinical effects. Furthermore, the content analyzed was limited to the YouTube platform. Future research could develop an optimal tool for evaluating digital content across a broader range of platforms, including TikTok, Instagram, and Facebook, and further investigate the clinical impact of these contents on physical activity in children and adolescents.

5. Conclusions

YouTube-based exercise education content targeting children has educational potential but faces limitations in terms of outcome assessment, presence of a qualified supervisor, target eligibility, adherence, and dosage parameters. Considering these aspects, YouTube-based content currently falls short as a substitute for in-person education. To supplement this, future integration with digital adherence technologies, hybrid interventions, and greater involvement of professional healthcare providers is necessary.

Moreover, the quality evaluation tools for video content and exercise programs were unable to evaluate YouTube-based content sufficiently. Considering that YouTube-based content is an inevitable trend that will continue to expand, it is necessary to develop a dedicated tool that can evaluate YouTube-based exercise programs for children.

Supplementary Materials: The following supporting information can be downloaded at: <https://www.mdpi.com/article/10.3390/healthcare13050560/s1>. Table S1: Keywords applied in YouTube search of this study. Table S2: Information about types of exercise for included videos in this study.

Author Contributions: J.H. methodology, software, formal analysis, resources, writing—original draft, and visualization; Y.D. validation, investigation, and data curation; D.-w.R. conceptualization, methodology, and supervision; N.Y.K. conceptualization, writing—review and editing, supervision, and project administration. All authors have read and agreed to the published version of the manuscript.

Funding: This research was supported by a grant from the Korea Health Technology R&D Project through the Korea Health Industry Development Institute (KHIDI), funded by the Ministry of Health and Welfare, Republic of Korea (grant no. RS-2023-00265489).

Institutional Review Board Statement: Not applicable.

Informed Consent Statement: Not applicable.

Data Availability Statement: The data sets generated in the present study are available by request from the corresponding author.

Acknowledgments: We would like to express our sincere gratitude to Hyunoh Sung for the invaluable assistance in writing the Python crawling code. The expertise and support provided were instrumental in the successful completion of this work.

Conflicts of Interest: All authors have no potential conflicts of interest.

References

1. Whooten, R.; Kerem, L.; Stanley, T. Physical activity in adolescents and children and relationship to metabolic health. *Curr. Opin. Endocrinol. Diabetes Obes.* **2019**, *26*, 25–31. [CrossRef] [PubMed]
2. Guthold, R.; Stevens, G.A.; Riley, L.M.; Bull, F.C. Global trends in insufficient physical activity among adolescents: A pooled analysis of 298 population-based surveys with 1.6 million participants. *Lancet Child Adolesc. Health* **2020**, *4*, 23–35. [CrossRef] [PubMed]
3. Telama, R.; Yang, X.; Viikari, J.; Välimäki, I.; Wanne, O.; Raitakari, O. Physical activity from childhood to adulthood: A 21-year tracking study. *Am. J. Prev. Med.* **2005**, *28*, 267–273. [CrossRef] [PubMed]

4. Piercy, K.L.; Troiano, R.P.; Ballard, R.M.; Carlson, S.A.; Fulton, J.E.; Galuska, D.A.; George, S.M.; Olson, R.D. The Physical Activity Guidelines for Americans. *Jama* **2018**, *320*, 2020–2028. [[CrossRef](#)]
5. Hallal, P.C.; Andersen, L.B.; Bull, F.C.; Guthold, R.; Haskell, W.; Ekelund, U. Global physical activity levels: Surveillance progress, pitfalls, and prospects. *Lancet* **2012**, *380*, 247–257. [[CrossRef](#)]
6. Wolff-Hughes, D.L.; Bassett, D.R.; Fitzhugh, E.C. Population-referenced percentiles for waist-worn accelerometer-derived total activity counts in U.S. youth: 2003–2006 NHANES. *PLoS ONE* **2014**, *9*, e115915. [[CrossRef](#)]
7. Abarca-Gómez, L.; Abdeen, Z.A.; Hamid, Z.A.; Abu-Rmeileh, N.M.; Acosta-Cazares, B.; Acuin, C.; Adams, R.J.; Aekplakorn, W.; Afsana, K.; Aguilar-Salinas, C.A.; et al. Worldwide trends in body-mass index, underweight, overweight, and obesity from 1975 to 2016: A pooled analysis of 2416 population-based measurement studies in 128.9 million children, adolescents, and adults. *Lancet* **2017**, *390*, 2627–2642. [[CrossRef](#)]
8. Walker, R.; House, D.; Salway, R.; Emm-Collison, L.; Hollander, L.E.; Sansum, K.; Breheny, K.; Churchward, S.; Williams, J.G.; de Vocht, F.; et al. The new normal for children’s physical activity and screen viewing: A multi-perspective qualitative analysis of behaviours a year after the COVID-19 lockdowns in the UK. *BMC Public Health* **2023**, *23*, 1432. [[CrossRef](#)]
9. Sui, W.; Rush, J.; Rhodes, R.E. Engagement With Web-Based Fitness Videos on YouTube and Instagram During the COVID-19 Pandemic: Longitudinal Study. *JMIR Form. Res.* **2022**, *6*, e25055. [[CrossRef](#)]
10. Bennell, K.L.; Marshall, C.J.; Dobson, F.; Kasza, J.; Lonsdale, C.; Hinman, R.S. Does a Web-Based Exercise Programming System Improve Home Exercise Adherence for People With Musculoskeletal Conditions?: A Randomized Controlled Trial. *Am. J. Phys. Med. Rehabil.* **2019**, *98*, 850–858. [[CrossRef](#)]
11. Edna Mayela, D.L.V.-C.; Miriam, L.-T.; Ana Isabel, G.-G.; Oscar, R.-C.; Alejandra, C.-A. Effectiveness of an online multicomponent physical exercise intervention on the physical performance of community-dwelling older adults: A randomized controlled trial. *Geriatr. Nurs.* **2023**, *54*, 83–93. [[CrossRef](#)] [[PubMed](#)]
12. Jung, M.-J.; Seo, M.-S. Assessment of reliability and information quality of YouTube videos about root canal treatment after 2016. *BMC Oral Health* **2022**, *22*, 494. [[CrossRef](#)] [[PubMed](#)]
13. Steeb, T.; Reinhardt, L.; Harlaß, M.; Heppt, M.V.; Meier, F.; Berking, C. Assessment of the Quality, Understandability, and Reliability of YouTube Videos as a Source of Information on Basal Cell Carcinoma: Web-Based Analysis. *JMIR Cancer* **2022**, *8*, e29581. [[CrossRef](#)] [[PubMed](#)]
14. Efe, I.E.; Tesch, C.; Subedi, P. YouTube as a source of patient information on awake craniotomy: Analysis of content quality and user engagement. *World Neurosurg.* **2024**, *21*, 100249. [[CrossRef](#)]
15. Goh, N.; Chan, K.S.; Teng, T.Z.J.; Shelat, V.G. Assessing the Educational Value of YouTube Videos on Major Laparoscopic Liver Resection: A Cross-sectional Study of the Top 20 Most Viewed Laparoscopic Right and Left Hepatectomy Videos. *Surg. Laparosc. Endosc. Percutan Tech.* **2022**, *32*, 747–754. [[CrossRef](#)]
16. Charnock, D.; Shepperd, S.; Needham, G.; Gann, R. DISCERN: An instrument for judging the quality of written consumer health information on treatment choices. *J. Epidemiol. Community Health* **1999**, *53*, 105–111. [[CrossRef](#)]
17. Hoozeboom, T.J.; Kousemaker, M.C.; van Meeteren, N.L.U.; Howe, T.; Bo, K.; Tugwell, P.; Ferreira, M.; de Bie, R.A.; van den Ende, C.H.M.; Stevens-Lapsley, J.E. i-CONTENT tool for assessing therapeutic quality of exercise programs employed in randomised clinical trials. *Br. J. Sports Med.* **2021**, *55*, 1153. [[CrossRef](#)]
18. Slade, S.C.; Dionne, C.E.; Underwood, M.; Buchbinder, R. Consensus on Exercise Reporting Template (CERT): Explanation and Elaboration Statement. *Br. J. Sports Med.* **2016**, *50*, 1428. [[CrossRef](#)]
19. Ozdemir, Z.M.; Yavuz, S.A.; Gursel Surmelioglu, D. YouTube as an information source in deep margin elevation: Reliability, accuracy and quality analysis. *PLoS ONE* **2025**, *20*, e0318568. [[CrossRef](#)]
20. Onder, M.E.; Zengin, O. Quality of healthcare information on YouTube: Psoriatic arthritis. *Z. Rheumatol.* **2023**, *82*, 30–37. [[CrossRef](#)]
21. Ng, C.H.; Lim, G.R.S.; Fong, W. Quality of English-language videos on YouTube as a source of information on systemic lupus erythematosus. *Int. J. Rheum. Dis.* **2020**, *23*, 1636–1644. [[CrossRef](#)] [[PubMed](#)]
22. Elangovan, S.; Kwan, Y.H.; Fong, W. The usefulness and validity of English-language videos on YouTube as an educational resource for spondyloarthritis. *Clin. Rheumatol.* **2021**, *40*, 1567–1573. [[CrossRef](#)] [[PubMed](#)]
23. Jang, C.W.; Bang, M.; Park, J.H.; Cho, H.E. Value of Online Videos as a Shoulder Injection Training Tool for Physicians and Usability of Current Video Evaluation Tools. *Int. J. Environ. Res. Public Health* **2022**, *19*, 15177. [[CrossRef](#)] [[PubMed](#)]
24. Geraci, I.; Barger, S.; Basso, G.; Castellini, G.; Chiarotto, A.; Gianola, S.; Ostelo, R.; Testa, M.; Innocenti, T. Therapeutic quality of exercise interventions for chronic low back pain: A meta-research study using i-CONTENT tool. *BMJ Evid. Based Med.* **2025**. [[CrossRef](#)]
25. McEwen, D.; O’Neil, J.; Miron-Celis, M.; Brosseau, L. Content Reporting in Post-Stroke Therapeutic Circuit-Class Exercise Programs in randomized control trials. *Top. Stroke Rehabil.* **2019**, *26*, 281–287. [[CrossRef](#)]
26. Voorn, M.J.J.; Franssen, R.F.W.; Hoozeboom, T.J.; van Kampen-van den Boogaart, V.E.M.; Bootsma, G.P.; Bongers, B.C.; Janssen-Heijnen, M.L.G. Evidence base for exercise prehabilitation suggests favourable outcomes for patients undergoing surgery for non-small cell lung cancer despite being of low therapeutic quality: A systematic review and meta-analysis. *Eur. J. Surg. Oncol.* **2023**, *49*, 879–894. [[CrossRef](#)]

27. Hoogeboom, T.J.; Oosting, E.; Vriezekolk, J.E.; Veenhof, C.; Siemonsma, P.C.; de Bie, R.A.; van den Ende, C.H.; van Meeteren, N.L. Therapeutic validity and effectiveness of preoperative exercise on functional recovery after joint replacement: A systematic review and meta-analysis. *PLoS ONE* **2012**, *7*, e38031. [\[CrossRef\]](#)
28. Kattackal, T.R.; Cavallo, S.; Brosseau, L.; Sivakumar, A.; Del Bel, M.J.; Dorion, M.; Ueffing, E.; Toupin-April, K. Assessing the reporting quality of physical activity programs in randomized controlled trials for the management of juvenile idiopathic arthritis using three standardized assessment tools. *Pediatr. Rheumatol. Online J.* **2020**, *18*, 41. [\[CrossRef\]](#)
29. Viera, A.J.; Garrett, J.M. Understanding interobserver agreement: The kappa statistic. *Fam. Med.* **2005**, *37*, 360–363.
30. Sekaran, U.; Bougie, R. *Research Methods for Business: A Skill Building Approach*; Wiley: Hoboken, NJ, USA, 2016.
31. Li, Z.; Yan, C.; Lyu, X.; Li, F.; Zeng, R. Assessing quality and reliability of online videos on tachycardia: A YouTube video-based study. *BMC Public Health* **2024**, *24*, 2620. [\[CrossRef\]](#)
32. Kwak, D.; Park, J.W.; Won, Y.; Kwon, Y.; Lee, J.I. Quality and reliability evaluation of online videos on carpal tunnel syndrome: A YouTube video-based study. *BMJ Open* **2022**, *12*, e059239. [\[CrossRef\]](#) [\[PubMed\]](#)
33. Friedrich, M.; Cermak, T.; Maderbacher, P. The effect of brochure use versus therapist teaching on patients performing therapeutic exercise and on changes in impairment status. *Phys. Ther.* **1996**, *76*, 1082–1088. [\[CrossRef\]](#) [\[PubMed\]](#)
34. Beinart, N.A.; Goodchild, C.E.; Weinman, J.A.; Ayis, S.; Godfrey, E.L. Individual and intervention-related factors associated with adherence to home exercise in chronic low back pain: A systematic review. *Spine J.* **2013**, *13*, 1940–1950. [\[CrossRef\]](#) [\[PubMed\]](#)
35. Musiimenta, A.; Tumuhimbise, W.; Mugaba, A.T.; Muzoora, C.; Armstrong-Hough, M.; Bangsberg, D.; Davis, J.L.; Haberer, J.E. Digital monitoring technologies could enhance tuberculosis medication adherence in Uganda: Mixed methods study. *J. Clin. Tuberc. Other Mycobact. Dis.* **2019**, *17*, 100119. [\[CrossRef\]](#)
36. Nelligan, R.K.; Hinman, R.S.; Kasza, J.; Crofts, S.J.C.; Bennell, K.L. Effects of a Self-directed Web-Based Strengthening Exercise and Physical Activity Program Supported by Automated Text Messages for People With Knee Osteoarthritis: A Randomized Clinical Trial. *JAMA Intern. Med.* **2021**, *181*, 776–785. [\[CrossRef\]](#)
37. Canli, U.; Aldhahi, M.I.; Küçük, H. Association of Physiological Performance, Physical Fitness, and Academic Achievement in Secondary School Students. *Children* **2024**, *11*, 396. [\[CrossRef\]](#)
38. Hinman, R.S.; Nelligan, R.K.; Campbell, P.K.; Kimp, A.J.; Graham, B.; Merolli, M.; McManus, F.; Lamb, K.E.; Bennell, K.L. Exercise adherence Mobile app for Knee Osteoarthritis: Protocol for the MappKO randomised controlled trial. *BMC Musculoskelet. Disord.* **2022**, *23*, 874. [\[CrossRef\]](#)
39. Yamamoto, Y.; Murata, Y.; Tanaka, N.; Shigemura, T.; Maruyama, J.; Nakane, R.; Wada, Y. Mobile application for home exercise adherence in patients with knee osteoarthritis: A pilot study. *Medicine* **2022**, *101*, e31181. [\[CrossRef\]](#)
40. Montón-Martínez, R.; Ballester-Ferrer, J.A.; Baladzhaeva, S.; Sempere-Ruiz, N.; Casanova-Lizón, A.; Roldan, A.; Pastor, D.; Sarabia, J.M.; Javaloyes, A.; Peña-González, I.; et al. Exploring the Impact of Web-Based vs. In-Person Exercise Training on Benefits and Adherence in Substance Use Disorder Interventions: A Pilot Study. *Healthcare* **2024**, *12*, 684. [\[CrossRef\]](#)
41. González-Serrano, M.H.; Alonso-Dos-Santos, M.; Crespo-Hervás, J.; Calabuig, F. Information management in social media to promote engagement and physical activity behavior. *Int. J. Inf. Manag.* **2024**, *78*, 102803. [\[CrossRef\]](#)
42. Goodyear, V.A.; Boardley, I.; Chiou, S.Y.; Fenton, S.A.M.; Makopoulou, K.; Stathi, A.; Wallis, G.A.; Veldhuijzen van Zanten, J.; Thompson, J.L. Social media use informing behaviours related to physical activity, diet and quality of life during COVID-19: A mixed methods study. *BMC Public Health* **2021**, *21*, 1333. [\[CrossRef\]](#)
43. Rowles, S.J. *Fitness Content on Social Media and Exercise Behaviors and Motivation in College Students*; The Ohio State University: Columbus, OH, USA, 2021.
44. Osman, W.; Mohamed, F.; Elhassan, M.; Shoufan, A. Is YouTube a reliable source of health-related information? A systematic review. *BMC Med. Educ.* **2022**, *22*, 382. [\[CrossRef\]](#)
45. Mayer, R.E. *Multimedia Learning*, 2nd ed.; Cambridge University Press: New York, NY, USA, 2009; pp. i–xiii, 1–304.

Disclaimer/Publisher’s Note: The statements, opinions and data contained in all publications are solely those of the individual author(s) and contributor(s) and not of MDPI and/or the editor(s). MDPI and/or the editor(s) disclaim responsibility for any injury to people or property resulting from any ideas, methods, instructions or products referred to in the content.