

# Social media, physical activity and autism: better or bitter together?

## A scoping review

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### Abstract

This review provides an overview of the existing research on social media, autism, and physical activity. We searched for publications on PubMed, PsycInfo, Embase, Education source, ERIC, IEEE Xplore, and the proceedings from conferences on health informatics and autism. Eight studies were included in this review. Studies reported mixed results on the link between social media, physical activity, and autism. Technology usage is related to sedentary time. However, physical activity interventions delivered through social media provide several benefits. Further research with stronger designs is needed to increase the knowledge of the role of social media on physical activity and autism.

### Keywords

Social Media; Autism Spectrum Disorder; Autistic Disorder; Physical Activity; Exercise

## 1 INTRODUCTION

Autism spectrum disorder (ASD) is a highly heritable neurodevelopmental condition characterized by distinctive patterns of social interaction and communication, and restricted and repetitive behaviours [1]. Limited evidence shows that autistic children and adolescents have a moderately decreased physical activity level compared with their neurotypical peers [2]. They are therefore a special risk group for health challenges, including obesity, diabetes, and depression. Autistic adults also report being less frequently physically active, showing less positive attitudes towards physical activity, having less perceived behavioural control of performing physical activity, and encountering more physical activity barriers [3].

Regular physical activity helps to prevent and manage noncommunicable diseases, to maintain healthy body weight and can also improve mental health, quality of life and well-being [4]. The World Health Organization recommends physical activity and limitation of the time spent being sedentary for both children, adolescents, adults, and also to individuals with disabilities, including autism [5].

Children and adolescents living with a disability such as ASD are recommended to spend at least 60 minutes a day in moderate-to-vigorous-intensity physical activity at least three days a week [5]. Adults living with a disability are recommended to spend at least 150 minutes in moderate or higher intensity physical activity throughout the week [5]. In addition to the benefits on health outcomes, regular physical activity might be beneficial for autistic children and adolescents to improve manipulative- and motor skills [6-9], social functioning [10, 9], communication and social skills [8, 9], and has a positively impact on sleep and mood [6].

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Both sedentary behaviour [11, 12] and physical activity behaviour [12] have been linked to the use of social media in neurotypical individuals. However not much is known about how social media are linked to physical activity and autism in the literature.

## 2 OBJECTIVE

The objective of this review is to provide an overview of the existing research linking social media, autism, and physical activity.

## 3 METHOD

In order to provide an overview of the existing research linking the use of social media, physical activity and autism, a scoping review was carried out. This scoping review followed the Preferred Reporting Items for Systematic Reviews and Meta-Analysis, extension for scoping reviews (PRISMA-ScR) [13].

### 3.1 Search strategy

This scoping review includes a secondary analysis of a broader review on social media and autism. The main search was conducted to identify publications that included in their titles and abstracts terms related to autism and terms related to social media. Figure 1 gives the search terms that were used in the query.

The search covered the following six databases: PubMed, PsycInfo, Embase, Education source; ERIC, and IEEE Xplore. No date or language limitations were used. The search was carried out on the 30<sup>th</sup> of March 2022.

Articles specifically dealing with social media, physical activity, and autism were identified in the main databases. An additional search was carried out across the latest online available abstract books or conference proceedings from three conferences in the field of health informatics: Scandinavian Conference on Health Informatics (SHI,

period 2012-2019), Medical Informatics Europe (MIE, period 2014-2021), and the World Congress in Medical and Health Informatics (MedInfo, period 2010-2019). We also searched proceedings from two conferences focused on autism: Autism Europe (period 2010-2019), and the International Society for Autism Research (INSAR, period 2010-2021).

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("Autism Spectrum Disorder" OR
 "Autism" OR
 "Asperger Syndrome" OR
 "Pervasive Developmental Disorder")
AND
("Social media" OR "Facebook" OR
 "Twitter" OR "Instagram" OR
 "YouTube" OR "TikTok" OR
 "WhatsApp" OR "WeChat" OR "Weibo" OR
 "Telegram")

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**Figure 1.** Search query

### 3.2 Inclusion and exclusion criteria

Publications were included in this review if they referred to: 1) social media, 2) autism, and 3) physical activity, and were primary studies or review papers reporting results. Opinion papers, study protocols, editorials, and letters to editor not reporting results, were excluded.

### 3.3 Eligibility, data extraction and quality of the evidence assessment

All captured references from the initial search were uploaded to EndNote 20 (Clarivate Analytics, Philadelphia, PA, US) and Rayyan (Rayyan, Cambridge, MA, US) [14]. After removing duplicates, the eligibility of the papers was assessed in two steps: first by checking titles and abstract, and then by checking full text. The selection of articles was done by one reviewer (EG) and verified by a second reviewer (ANH). A third reviewer (AH) looked for possible full-text articles related to the included conferences abstracts. One reviewer (EG) extracted the following data from the articles: country of origin, publication year, study design, participant characteristics, and main findings.

The quality of evidence of the included studies on the findings linking social media, physical activity, and autism was assessed by one reviewer (EG) by following the Grading of Recommendations Assessment, Development and Evaluation (GRADE) guidelines [15].

## 4 RESULTS

### 4.1 Sample description

A total of 1998 references were identified in the database search. After removing 188 duplicates, a total of 1810 records from the search in databases were assessed for eligibility. 1703 references were excluded during title and abstract screening. A total of 107 publications dealing with autism and social media were reviewed in full text. Five publications met the inclusion criteria [16-20]. Three additional abstracts were obtained from the manual search in conference proceedings and were included in this review [21-23]. These abstracts were replaced with their respective full-text articles [24-26]. The PRISMA flowchart of the selection procedure is reported in Figure 2.

A summary of all included studies, sorted by GRADE score, can be found in Table 1. All eight included studies were published between 2015 and 2021. Two of these studies were from Turkey [16, 20], two from USA [17, 18], two from USA and UK [24, 25], one from USA, Canada and UK [26], and one from Ireland [19].

Among the eight included publications, four were interventional studies that used specific social media channels to deliver a physical activity intervention to parents of autistic children [16-18, 20]. The other four publications were observational studies that used social media to recruit autistic adults or parents of children diagnosed with autism. These studies used interviews or surveys to get information on different aspects related to their physical activity behaviour [24-26, 19].

The GRADE assessments related to level of evidence of the findings linking social media, physical activity and autism were graded as moderate in two of the studies [26, 20], low in five studies [24, 25, 16-18], and very low in one study [19].

### 4.2 Participants and main findings

Three of the included studies were specifically focused on autistic adults [24-26]. One of these studies (Kim et al.) [26] used an online survey that involved 229 autistic adults plus 10 interviews (four interviews with experts on autism and six to autistic adults). That study shows that there is moderate evidence linking sedentary time in autistic adults with technology usage time [26]. The two other studies (Balgrave et al.; and Colombo-Dougovito et al.) [24, 25] interviewed 23 autistic adults. These two studies indicate that there is low evidence referring to the features or functionalities that a technology-based intervention could have to increase physical activity in adults (i.e., importance of creating non-competitive experiences, importance of considering sensory factors, importance of listening to insight of autistic adults, as well as encouraging and providing social support) [24, 25].

One further survey study (Kindregan et al.) [19] gathered information from 221 parents, 48% of which had a child with a diagnosis of ASD. Answers from these parents indicate that autistic children spend significantly less time per week being physically active compared to neurotypical kids, and significantly more time is spent being sedentary (including watching television or using a computer) [19].

Four included articles were intervention studies involving families with a child who had a diagnosis of ASD [16-18, 20]. Two of these publications are findings from the same 4-week intervention using Facebook private groups (Healy et al.; Healy et al.) [17, 18]. The intervention consisted of delivering instructional and motivational strategies to parents of 13 families and were aimed at stimulating their autistic child aged 6-16 years old [17, 18]. These two studies indicate that there is low evidence indicating that parents perceived the private *Facebook* groups intervention successful as a source of motivation, as a reminder to take action, and as a source of social support [17, 18].

Two other intervention studies analysed the feasibility and effects of a physical activity intervention delivered to parents of autistic children on a *WhatsApp* group (Esentürk et al.; Yarimkaya et al.) [16, 20]. The feasibility study included 14 parents and showed that a 4-week intervention was feasible to increase physical activity levels of their autistic child aged 9-14 years old ((Esentürk et al.)[16]. The subsequent randomized 6-week intervention involving 42 families indicate moderate evidence linking a significant increase in the physical activity level of autistic children aged five years old with the experimental intervention delivered through *WhatsApp* (Yarimkaya et al.)[20].

## 5 DISCUSSION

### 5.1 Summary of findings

There is very little evidence linking social media, physical activity, and autism. The present review shows that the usage of social media as platforms that can be used for physical activity training, but also that this topic is understudied, and the rigour of studies can be improved in future research projects.

### 5.2 Cons and pros of social media and physical activity in autism

Although physical activity as an alternative or complementary intervention shows promise for autistic individuals [6-8, 10, 9, 27], currently there are not any stand-out recommended interventions with clear gains within developmental domains such as social or motor development [1, 28].

Findings from two of the included studies indicate that using social media and other technologies is related to an increased sedentary time among both autistic children and adults [26, 19]. These findings agree with previous research with neurotypical population [11, 12].

However, social media could also be used to promote physical activity among their users [29]. The ubiquity and high usability of social media make these channels an environment of great potential to motivate their users to increase physical activity, including autistic children and adults. Research shows that interventions delivered through private social media channels, such as *Facebook* private groups and *WhatsApp*, can be successful sources of motivation [16-18, 20]. These channels can be used to send reminders to parents of autistic children, but also represent powerful environments of social support through interaction with others on the platform that can be helpful to instigate taking action and engage in physical activity [29]. Besides, the availability of social media for parents and autistic adults might be preferred by many as compared to more time-consuming interventions delivered by on-site interventionists.

### 5.3 How social media interventions should be to have a positive effect on physical activity for autistic individuals?

Interventions delivered through social media have proven to be effective to increase physical activity among neurotypical population [30] and probably could be beneficial among individuals with ASD too. Findings in our review indicate that there are a series of functionalities and features that should be considered when designing a

physical activity intervention to be delivered through social media and targeting individuals with ASD.

Although there is very little evidence, using a participatory approach, where insight and perspectives of autistic adults are included, could make interventions addressed to them more accessible and increase their use [24]. According to autistic adults these interventions should be encouraging and providing social support for physical activity participation [24]. However, participation of autistic individuals should be social but not competitive [22]. In addition, because sensory factors play a key role in the success of physical activity experiences for autistic individuals [22], considering sensory stimuli when planning for physical activity participation seems to be of relevance [24].

### 5.4 Activity trackers for physical activity interventions

The connection of activity trackers to social media could also be considered in order to increase physical activity among autistic individuals. Activity trackers have proven to be an effective feature in promoting a positive behaviour change [31, 32].

The use of consumer-based physical activity trackers as a motivational tool in physical activity interventions are becoming more common. Although there are few intervention studies using such trackers in neurodivergent populations, a study by Garcia et al. [33] indicate that it is feasible to use a Fitbit in this setting for youth with ASD. A similar study by Michalsen et al. [34] is currently ongoing among people with intellectual disabilities.

However, using consumer-based physical activity trackers have some privacy related challenges that have to be considered. For instance, the ownership of collected data is often unclear (i.e., is it owned by the vendor or the tracker owner?), and it is rarely possible to prevent data from being stored in vendor-owned cloud servers (often located abroad).

Integrating behaviour change techniques that have proven to be effective among neurotypical population [31], such as goal setting, feedback, and monitoring, prompts or rewards, might also help to increase physical activity among autistic individuals.

### 5.5 Limitations

Only one author screened the papers and assessed the quality of evidence. Although we did not use any language or year limitation on our search, we have only identified eight studies dealing with autism, physical activity, and social media. We believe the search engine and covered databases and conference proceedings allowed us to capture relevant publications in this field. However, we might have missed studies that included different keywords, were indexed in different databases, or presented in different conferences.

### 5.6 Conclusions

Social media could represent an effective media for promoting physical activity to autistic children and adults. However further research with stronger design is needed to understand the current role of these channels in relation to physical activity and sedentarism, and the potential of social media on physical activity and autism.

## 6 CONFLICT OF INTERESTS

Authors declare no conflict of interests.

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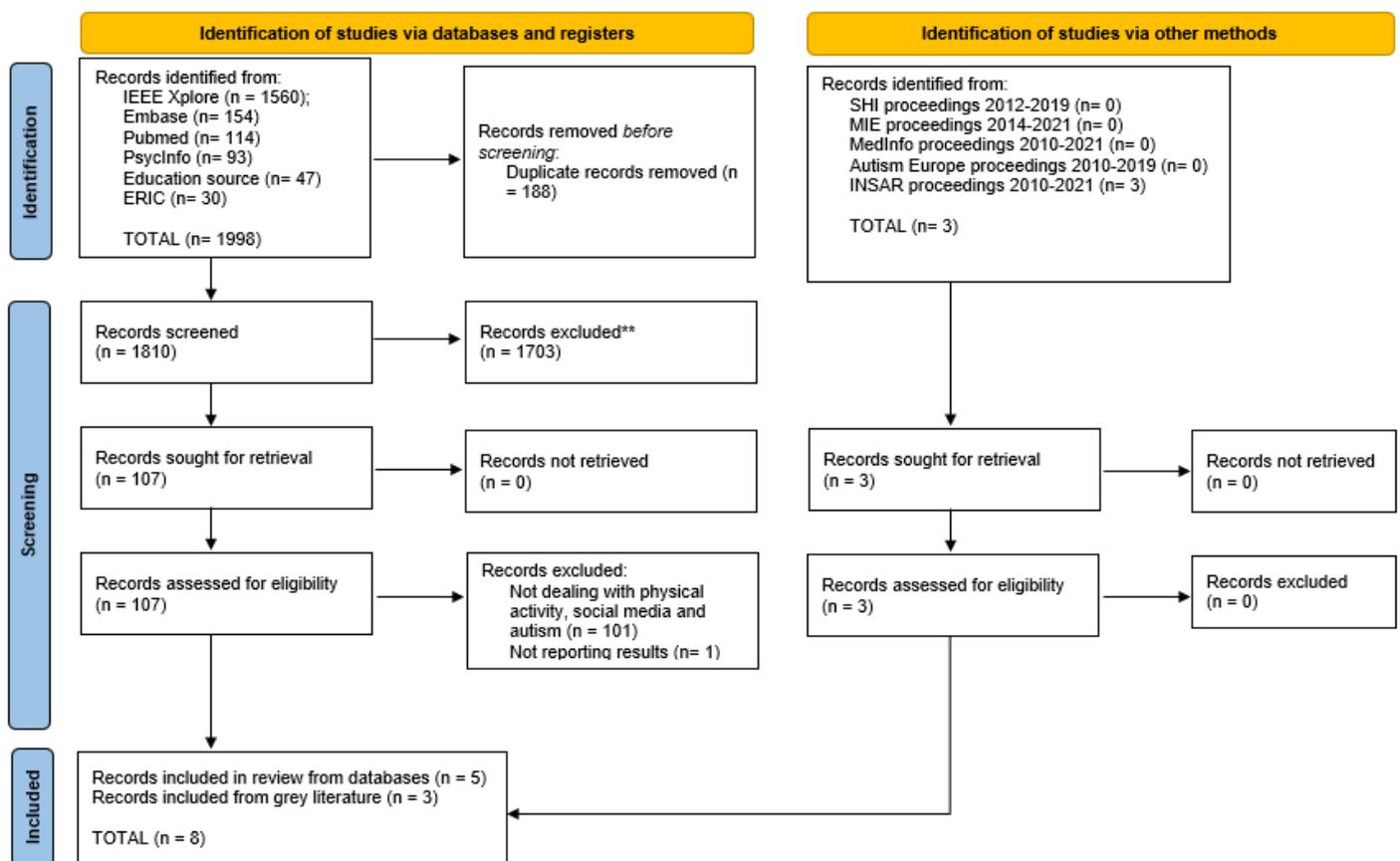


Figure 2. PRISMA flowchart of the selection process

Paper	Study design and method	Participants	Findings	GRADE level of evidence
Yarimkaya et al. [20]	Randomized study (6-weeks intervention to parents on WhatsApp group)	42 families (parent and child dyads). 21 intervention/21 control group	Significant increase in the physical activity level of children with ASD in the experimental group compared to the control group. Parents reported benefits (increased levels of physical activity; promoted family participation; improved movement skills; and reduced technological tool addiction); and usefulness of the intervention (support for physical education; useful information provided by intervention; support to create new routines)	Moderate
Kim et al. [23]	Observational study (online survey and interviews)	229 autistic adults	Adults with ASD used their smartphones more than four hours per day. Sedentary time was significantly correlated with technology usage time ( $r = 0.34, p < 0.001$ ).	Moderate
Colombo et al. [22]	Observational study (interviews)	23 autistic adults	Importance of creating non-competitive and social experiences. Sensory factors play a key role in the success of physical activity experiences for autistic adults.	Low
Balgrave et al. [24]	Observational study (interviews)	23 autistic adults	Physical activity can be made more accessible for autistic adults by: (1) listening to the perspectives and insight of autistic adults, (2) considering sensory stimuli when planning for physical activity participation, and (3) encouraging and providing social supports for physical activity participation.	Low

Esenturk et al. [16]	Intervention study (4-weeks intervention to parents on WhatsApp group)	14 parents and their children with ASD	WhatsApp-based physical activities were a feasible intervention to increase the physical activity level of their children with ASD and stated that the contents of the physical activity shared in the WhatsApp group were useful.	Low
Healy et al. [18]	Feasibility study (4-weeks intervention to parents on private Facebook group)	13 families with a child (age 6-16 years) with ASD	All parents were satisfied or very satisfied with their overall experience of the project.	Low
Healy et al. [17]	Intervention study (4-weeks intervention to parents on private Facebook group)	13 families with a child (age 6-16 years) with ASD	Parents reported an overall positive perspective of the intervention. The parents perceived the intervention to be particularly successful as a source of motivation, a reminder for them to take action, and as a source of social support.	Low
Kindregan et al. [19]	Observational study (online survey)	221 parents responded survey. 48% of them had a kid with ASD	56 % of children with ASD spent over 6 h per week in sedentary behaviour such as watching television or on a computer, significantly more than typically developing children at 33 % ( $p<0.05$ ).	Very low

**Table 1.** Summary of included studies