

**A conference presented by**

**SQETGC**

Service québécois d'expertise  
en troubles graves du comportement

RÉSEAU NATIONAL  
D'EXPERTISE  
EN TROUBLE  
DU SPECTRE DE  
L'AUTISME



**"Autism and screens: a complex relationship"**

**January 18th, 2023 – 9 AM to 4PM**



**Talk to Me: Autism and Technology**

McLeod Frampton Gwynette, MD

Professor of Psychiatry and Behavioral Medicine  
Medical University of South Carolina





# Talk to Me: Autism and Technology

January 18, 2023

**Service québécois d'expertise en troubles graves du comportement (SQETGC)**

M. Frampton Gwynette, MD  
Professor of Psychiatry and Behavioral Medicine  
Medical University of South Carolina  
Charleston, South Carolina  
[gwynette@musc.edu](mailto:gwynette@musc.edu)

## Disclosures: M.F. Gwynette, MD

Source	Grant Support	Employee	Research Support
Medical University of South Carolina		X	
AACAP Speaker Fees	X		
Simons Foundation			X

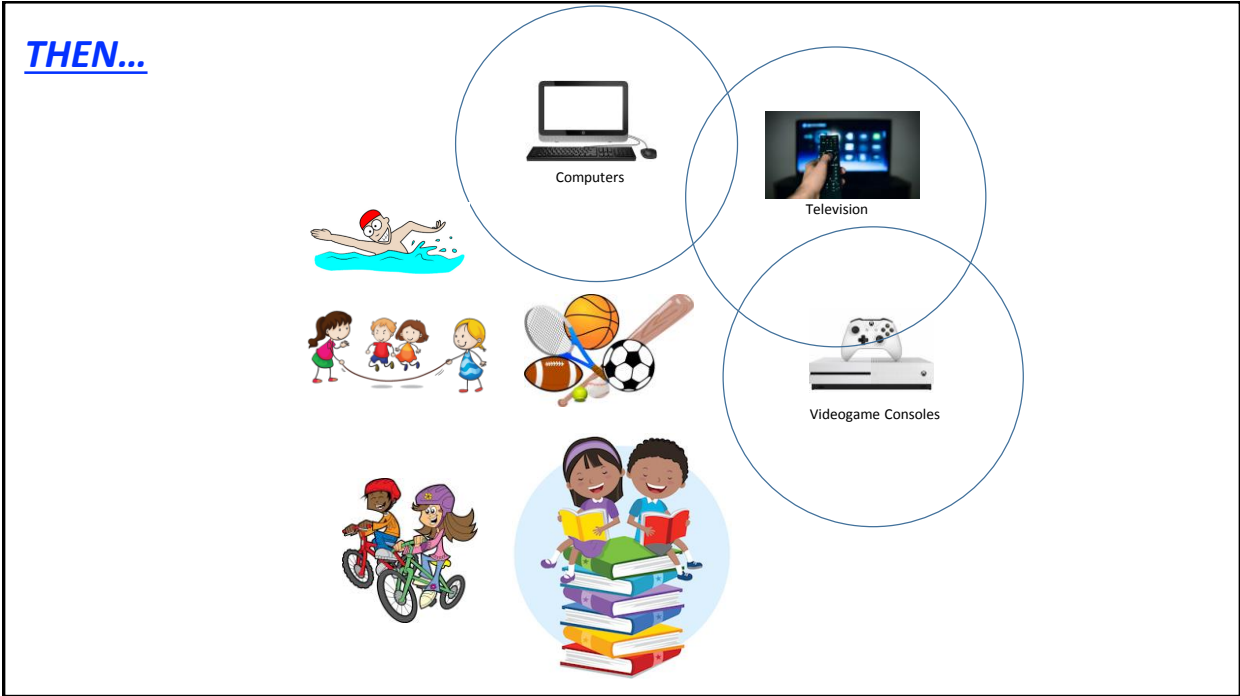
## Learning Objectives

At the conclusion of this continuing medical education activity, the participant will be able to:

1. Describe the pattern of screen time usage in patients with autism spectrum disorder (ASD) compared to neurotypical peers.
2. Discuss the evidence for using technology to assist in the treatment of patients with ASD.
3. Identify the unique risks of extended screen time and/or internet usage for patients with ASD.

**What is the relationship status between Autism Spectrum Disorder and Technology?...**

**...“It’s complicated.”**



**One very interesting question:**

*Does exposure to technology/electronic screen media increase risk of Autism-like symptoms or traits?*

What's the risk?



# Tech- nology



Potential Benefits	Autism Symptoms, Deficits	Potential Risks
<ul style="list-style-type: none"> <li>• Can help with social skills, joint attention</li> <li>• Can promote language development</li> </ul>	<p><b>Social &amp; Communication Deficits</b></p>	<ul style="list-style-type: none"> <li>• Tendency is to use technology non-socially</li> <li>• Cyberbullying</li> <li>• Increased social isolation</li> </ul>
<ul style="list-style-type: none"> <li>• Can reduce repetitive behaviors</li> <li>• ASD patients have an affinity for technology</li> </ul>	<p><b>Restricted, Repetitive Interests, Behaviors and Activities</b></p>	<ul style="list-style-type: none"> <li>• Difficulty detaching from device</li> <li>• Risk of internet addiction</li> </ul>
<ul style="list-style-type: none"> <li>• May learn more efficiently using technology</li> <li>• Can be used to build executive functioning skills</li> </ul>	<p><b>Cognitive &amp; Executive Functioning</b></p>	<ul style="list-style-type: none"> <li>• Possible increased risk for ADHD</li> <li>• May interfere with sleep</li> </ul>

Gwynette, Sidhu, Ceranoglu *Child and Adolescent Clinics of North America*, 2018

## Individuals with Autism *gravitate to technology*



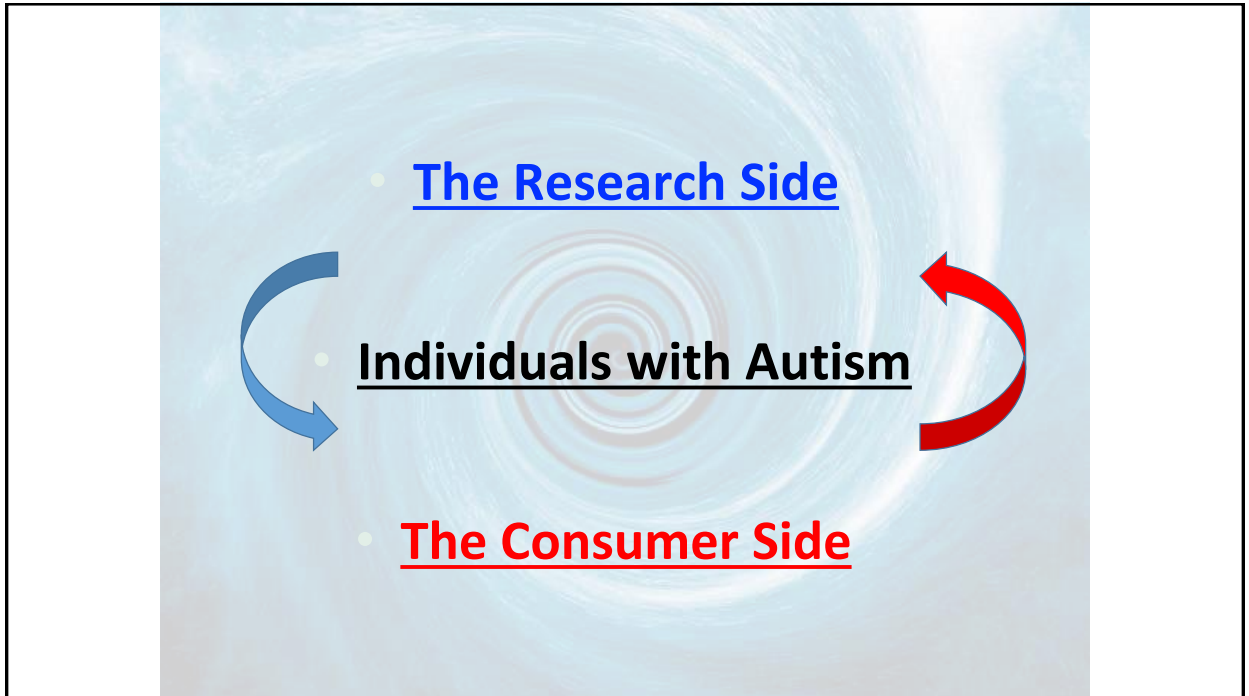
- Strong Preference for Video Games: Online “Handle”
- Watch more television <sup>1</sup>
- Spend 4.5 hours a day on screen time with 2 or less hours on non-screen activities<sup>2</sup>
- Most ASD youth spend the majority of their free time on screens compared to 18% peers<sup>3</sup>
- Adolescents with ASD play video games twice as much as watching television. <sup>4</sup>

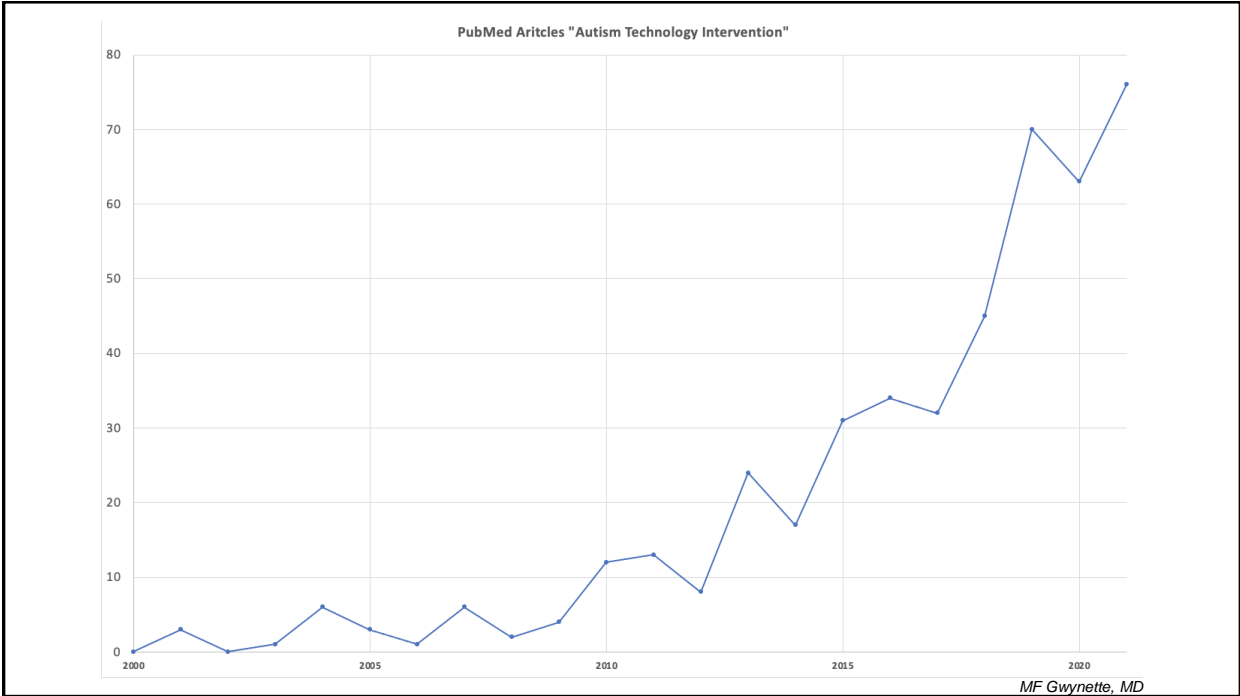
1. Healy S, Haegele JA, Grenier M, Garcia JM. *Journal of autism and developmental disorders*. 2017
2. Mazurek MO, Wenstrup C. *Journal of autism and developmental disorders*. 2013;
3. Mazurek MO, Shattuck PT, Wagner M, Cooper BP. *Journal of autism and developmental disorders*. 2012
4. Kuo MH, Orsmond GI, Coster WJ, Cohn ES. *Autism*. 2014

## The Consumer Side



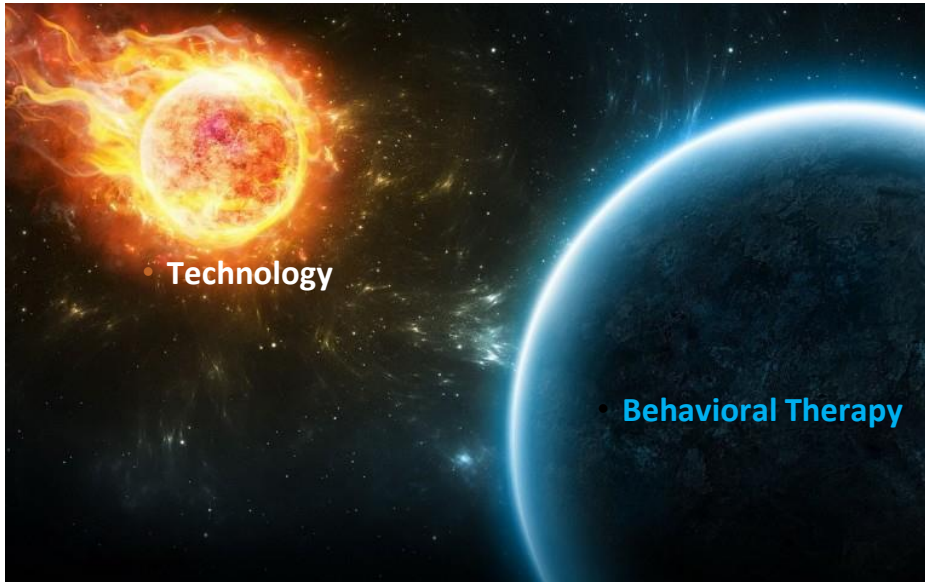






# Tech-





Gwynette, Sidhu, Ceranoglu. *Child Adol Clinics N America*, 2018

- The use of iPad®/tablet technology for patients with Autism Spectrum Disorder has been applied to multiple aspects of intervention and treatment.

# 49%

**OF CHILDREN WITH AUTISM “ENGAGE IN ELOPEMENT BEHAVIOR, WITH A SUBSTANTIAL NUMBER AT RISK FOR BODILY HARM.”**

— *Pediatrics 2012, aap.org*

**For information on wandering/elopement prevention, visit [awaare.org](http://awaare.org)**

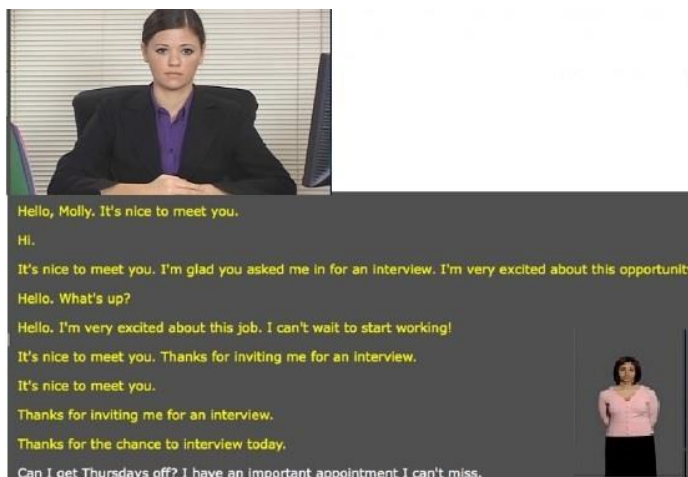


## Watches and other wearable technology

- Assessing movements in high-risk neonates
- Monitoring autonomic response to behavioral interventions
- Prevent elopement and wandering
- Monitoring self-regulation and intervening when needed
- Aiding in the physiological detection of anxiety, and characterizing the response to social cues through eye-tracking

- Billeci L, Tonacci A, Tartarisco G, et al. *Frontiers in neuroscience*. 2016
- Di Palma S, Tonacci A, Narzisi A, et al. *Computers in biology and medicine*. 2017
- Kushki A, Khan A, Brian J, Anagnostou E. A Kalman. *IEEE transactions on bio-medical engineering*, 2015
- Singleton G, Warren S, Piersel W. *IEEE Engineering in Medicine and Biology Society Annual Conference*, 2014

## Virtual Reality Job Interview Training



Hello, Molly. It's nice to meet you.

Hi.

It's nice to meet you. I'm glad you asked me in for an interview. I'm very excited about this opportunity.

Hello. What's up?

Hello. I'm very excited about this job. I can't wait to start working!

It's nice to meet you. Thanks for inviting me for an interview.

It's nice to meet you.

Thanks for inviting me for an interview.

Thanks for the chance to interview today.

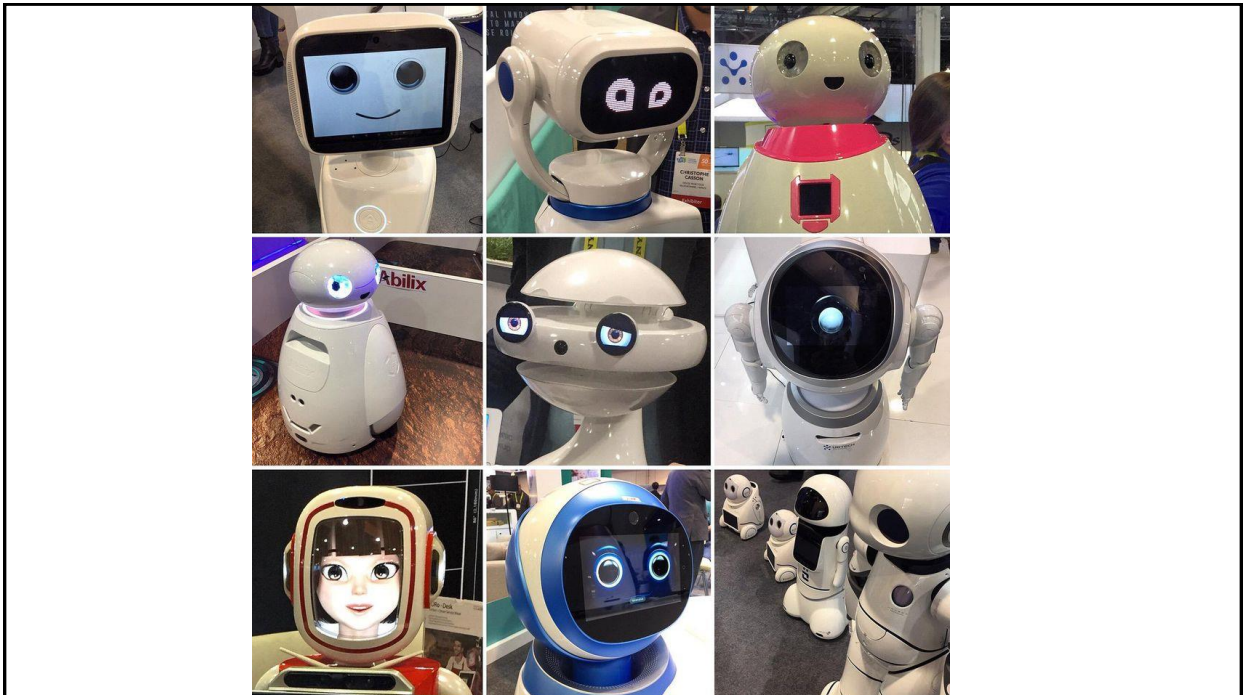
Can I get Thursdays off? I have an important appointment I can't miss.

- Smith MJ, Ginger EJ, Wright K, et al. Virtual reality job interview training in adults with autism spectrum disorder. *Journal of autism and developmental disorders*. 2014;44(10):2450-2463.

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- Wade, J., et al. (2017). "A Pilot Study Assessing Performance and Visual Attention of Teenagers with ASD in a Novel Adaptive Driving Simulator." *J Autism Dev Disord* 47(11): 3405-3417.
- Video web address: [https://www.youtube.com/watch?time\\_continue=159&v=nJxQPCNP4oA](https://www.youtube.com/watch?time_continue=159&v=nJxQPCNP4oA)





## KASPAR

- Strengths:
- Playfulness
- Neutral expression
- Consistent and repetitive application of actions
  
- Challenges of working with KASPAR:
- Limited reaction possibilities,
- Difficulties with generalization
- Dependence?

• Huijnen, C., et al. *J Autism Dev Disord* 2018

## Autism and Telemedicine



Results strongly support the clinical acceptability and diagnostic utility of telemedicine for autistic patients, while also highlighting the significant need for future research.

Wagner L, Wettlauf AS, Hine J, et al. *Journal of autism and developmental disorders*.  
Dahiya AV, DeLucia E, McDonnell CG, Scarpa A. *Res Dev Disabil*. 2021

### • How can gaming positively impact those with ASD?

- **Perform tasks better on the computer** (e.g. Wisconsin Card Sorting Task) (Ozonoff, 1995)
- Are more attentive and motivated using a computer (e.g. Whalen, et al., 2006)
- Learn better with visual tools (e.g. Rao & Gagie, 2006)
- Can learn social skills through video games (e.g. Piper, O'Brien, & Morris, 2006)
- Can reduce repetitive behavior (Anderson-Hanley, et al., 2011)
- Can improve executive function skills (not just ASDs) (Griffiths, 2002)



• Slide courtesy of Christina Whalen, Ph.D., BCBA-D



**-nology**



## Risks of Excessive Screen Time

- Delayed language development [5, 6]
- Attention deficit hyperactivity disorder (ADHD) behaviors [7]
- Reduced ability to read facial cues [8]
- Sleep disorders [9]
- Increased aggressive behavior, particularly when persons watch violent media [10]
- Poorer self-regulation and greater likelihood of participating in risky behavior [11]
- More unhealthy food choices made in response to commercials for high-sugar/high-calorie food and drinks [12]; more likely to develop obesity as a result of food choices and less physical exercise [13]
- Screen addiction [14]

*From: Westby C. Folia phoniatica et logopaedica 2021*

## Does Excessive Screen Time Correlate with Autism?

- Compared with TD children, children with ASD have longer screen time.
- The screen time is related to autism-like symptoms.
- The longer the screen time, the more severe the symptoms of ASD (especially sensory symptoms), and the more obvious the developmental delay
- Especially in ASD children with a longer screen time and younger age, particularly in the language domain

Dong HY, Wang B, Li HH, Yue XJ, Jia FY. *Frontiers in psychiatry*. 2021

## Does Excessive Screen Time Correlate with Autism?

- Younger initial age, longer daily screen time and longer cumulative years of screen exposure were associated with the presence of autistic-like behaviors at preschool age.
- The first three years following birth might be a sensitive period for children when screen exposure increases the risk of experiencing autistic-like behaviors.

Chen JY, Strodl E, Wu CA, et al. *Psychol Health Med*. 2021

## Does Excessive Screen Time Correlate with Autism?

The results showed that the hours spent using the electronic device were significantly associated with having an SCQ score  $\geq 15$

Alrahili N, Almarshad NA, Alturki RY, et al. *Cureus*. 2021

## Does Excessive Screen Time Correlate with Autism?

36-month olds: Increased screen time was associated with lower receptive and expressive language scores across groups.

Hill MM, Gangi D, Miller M, Rafi SM, Ozonoff S. *Infant Behav Dev*. 2020

## Does Excessive Screen Time Correlate with Autism?

Among 2152 children, television and/or video viewing at 12 months of age:

- Significantly associated with greater ASD-like symptoms at 2 years of age
- But not with ASD risk

Heffler KF, et al. *JAMA pediatrics*. 2020

## Does Excessive Screen Time Correlate with Autism?

16 studies support the view that children and adolescents with ASD are exposed to more screen time than their typically developing peers or other clinical groups and that the exposure starts at a **younger** age.

The content and context of screen use (e.g., **with parents vs alone**) may affect the behaviors associated with media exposure.

Correlates and long-term consequences of **early screen exposure** (before the age of 3 years) remain largely unexamined.

Slobodin, O., et al. *J Dev Behav Pediatr* 2019

# Are youth with Autism Vulnerable to Problematic Screen Usage?

Clinical research should examine how media can be used as an effective positive reinforcer and method for reducing sensory overload, without becoming the child's preferred play or coping strategy.

Providers may need to ask more about the child's specific relationship with media, to tailor advice with the goal that media use becomes a productive, but not dominant part of everyday life.

Lane, R. and J. Radesky *J Dev Behav Pediatr* 2019

## How Does Technology Impact...

Cognitive/Language Development

Physical Health/Obesity

Social Functioning/Autism



## Physiological Impact of Extended Media Time

**2 hours** of tablet exposure prior to bed resulted in significantly **decreased melatonin levels** in teens and young adults

Wood B, Rea M, Pitnick B, et al. "Light Level and Duration of Exposure Determine the Impact of Self-Luminous Tablets on Melatonin Suppression." Applied Ergonomics. 2013 Mar;44(2):237-40.

Slide courtesy of Shawn S. Sidhu, M.D.

## Physiological Impact of Extended Media Time

ASD youth have been found to watch significantly more television and are **more likely to be overweight or obese** than peers (Healy 2016).

Parents of ASD youth report significantly increased **barriers to physical activity**, with barriers being positively correlated to screen time (Must 2015)

• Healy S, Haegele JA, Grenier M, et al. "Physical Activity, Screen-Time Behavior, and Obesity Among 13-Year Olds in Ireland With and Without Autism Spectrum Disorder. J Autism Dev Disord. 2016 Sep.

• Slide courtesy of Shawn S. Sidhu, M.D.

## Social Impact of Extended Media Time

Non-autistic preteens spent 5 days in a nature camp without access to screens and were compared to teens who were allowed to use media as usual.

Camp attendees performed significantly higher than controls at reading facial expressions and interpreting non-verbal cues



- Uhls YT, Michikyan M, Morris J, et al. Five days at outdoor education camp without screens improves preteen skills with nonverbal emotion cues. *Computers in Human Behavior*. 2014;39:387-392.

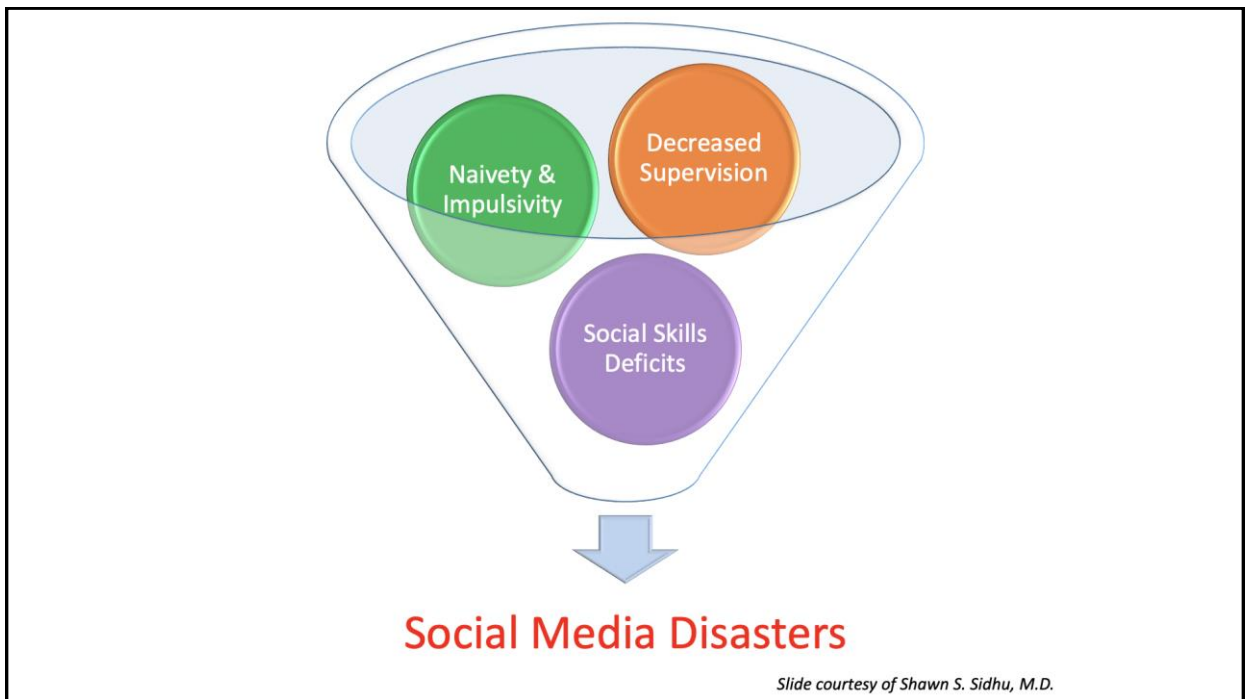
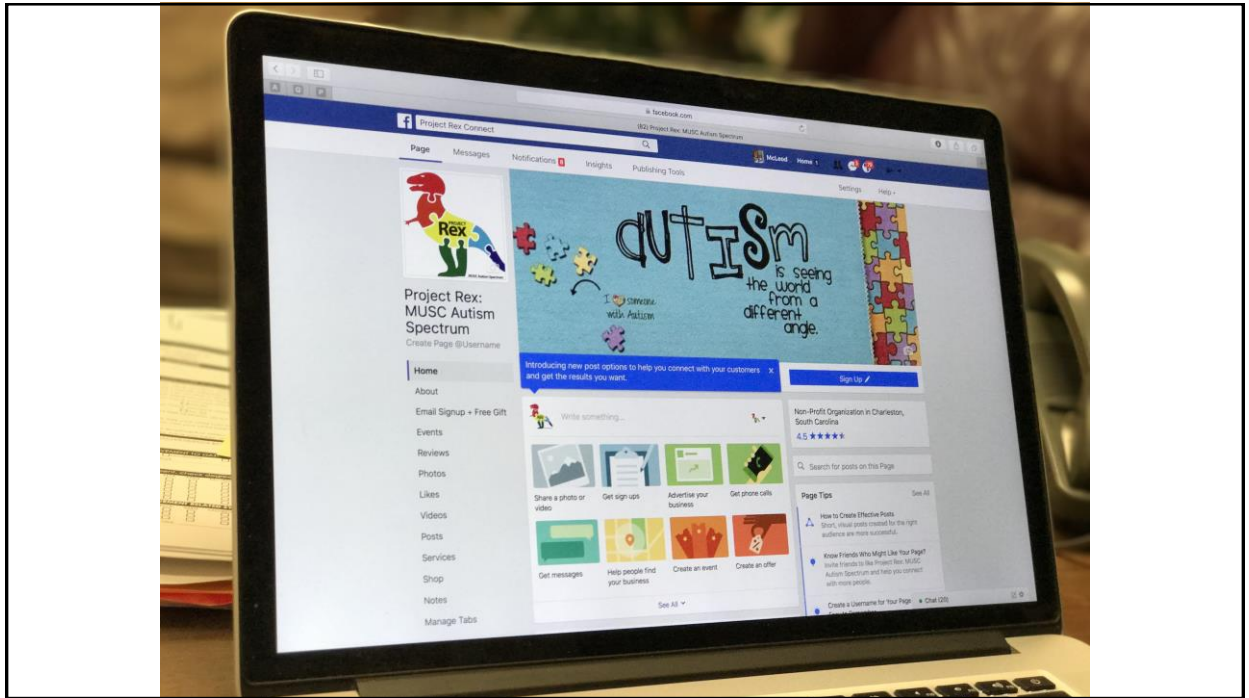
## Limiting access to social media in typically developing college students:

Facebook <10 minutes  
Instagram <10 minutes  
Snapchat <10 minutes

➤ Showed significant reductions in loneliness and depression over 3 weeks compared to the control group.

- Hunt, MG., et al. (2018). "No More FOMO: Limiting Social Media Decreases Loneliness and Depression." *Journal of Social and Clinical Psychology*. 751-768.

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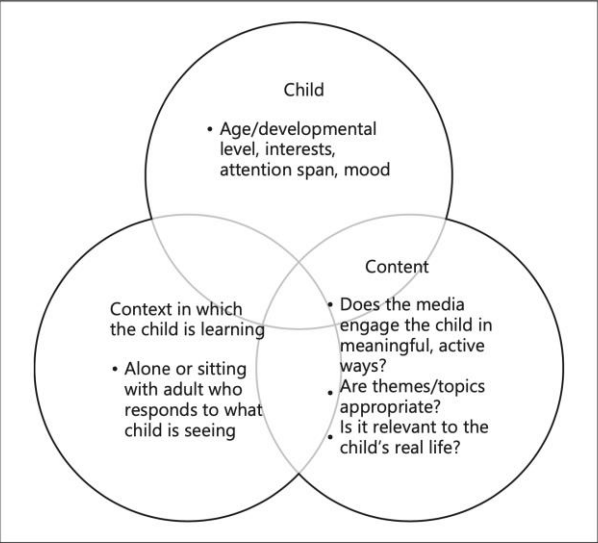
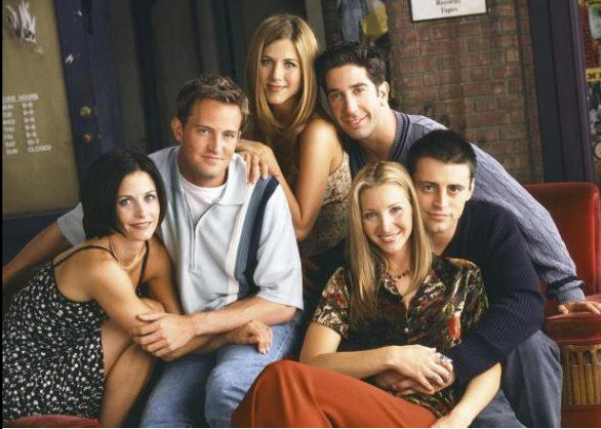
## Tools for Clinical Practice

### Electronic Screen Media (ESM) Use: Taking a history

<b>Quantitative</b>	<b>Qualitative</b>
Hours per week day	Activity (e.g. offline games, online games, social media, email, YouTube, school work).
Hours per weekend day	Type of games (if applicable): individual, online, role-player
Length of time between last use of ESM and going to bed	Emotional reaction of the child to parents setting limits on ESM

**In Real Life Contacts (IRL) > Online-only Contacts!!!**

Gwynette, Sidhu, Ceranoglu 2018 Child Adolesc Clinics N America

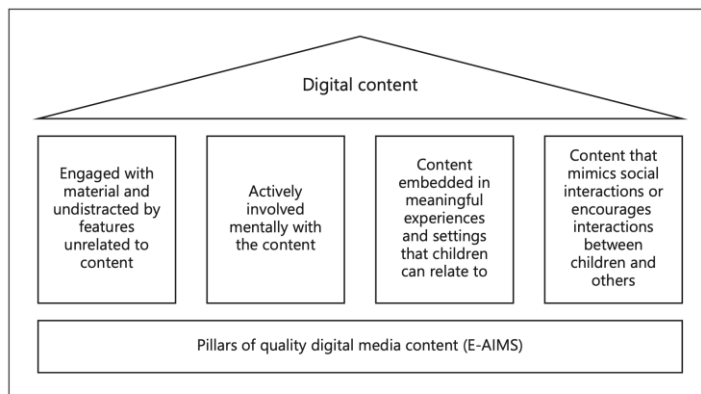


**Fig. 1.** Factors to consider when using digital media.

Westby C. *Folia phoniatrica et logopaedica*, 2021

# What is Quality Digital Content?

- Engaging
- Actively Involved
- Meaningful
- Social



Hirsh-Pasek K, Zosh JM, et al. *Psychol Sci Public Interest*. 2015



## Acknowledgements

### The Project Rex Team:

James Truelove, MSW  
Jennifer Warthen, MSW  
Nancy J. Warren, PhD  
Amanda Eblin, DNP  
Danielle Lowe, MD, PhD  
Melanie Wiley

- Shawn S. Sidhu, M.D.
- T. Atilla Ceranoglu, M.D.
- Ben Kinsella, BEng
- Christina Whalen, Ph.D.



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