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"Media Use and the Analytical Brain": Screen-Based Media Use and Behavioral Preference in Indonesian Children

["Penggunaan Media dan Otak Analitik": Penggunaan Media Berbasis Layar dan Preferensi Perilaku Anak Indonesia]

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This study aims to examine the relationship between screen-based media use and autistic features. The present study involved 207 parents of Indonesian children 4-6 years old and 10-12 years old. Parents completed several questionnaires addressing children screen-based activities and level of autistic traits. The questionnaires are: (1) a screen-based media survey; (2) Empathizing-Systemizing Quotients (EQ-SQ Child); and (3) The Autism Spectrum Quotient (AQ-Child). An online survey was utilized to collect all study data. The results showed that children spent more than four hours on average per day with media use. The regression analysis indicated that total time spent by children on media use shows a positive correlation with systemizing. The total time spent by children on media use also positively correlated with the extreme male brain condition. The total time spent on screen-based media use did not significantly contribute to explaining the variance of empathizing. However, empathizing is negatively correlated with time devoted in watching activities (television, videos, and movies) and playing video games. The more children spend time playing in video games, the more the autism quotient (AQ) score increases. Finally, the current study provides empirical evidence for a relation of screen-based media use and autistic features in children. The findings suggest that the duration of screen-time are significant predictors of systemizing and extreme male behavior, albeit the significance for empathizing depends on the type of media. The results highlight the clinical importance of examining screen-based media use among children.

Keywords: screen-based media use, empathizing, systemizing, autistic traits, children in Indonesia

Studi ini bertujuan untuk menguji hubungan antara penggunaan media berbasis layar dengan karakteristik autisme. Studi ini melibatkan 207 orang tua di Indonesia yang memiliki anak berusia 4-6 tahun dan 10-12 tahun. Orang tua menyelesaikan beberapa survei secara daring. Kuesioner tersebut terdiri dari: (1) survei mengenai durasi penggunaan media berbasis layar pada anak; (2) skala *Empathizing-Systemizing Quotient (EQ-SQ Child)*; dan (3) skala *Autism Spectrum Quotient (AQ-Child)*. Hasil studi menunjukkan bahwa anak menghabiskan waktu secara rerata lebih dari empat jam per hari dengan penggunaan media. Analisis regresi menunjukkan bahwa durasi total penggunaan media berkorelasi positif dengan tingkat sistemisasi anak dan *extreme male brain behavior*, namun tidak berkontribusi secara signifikan dalam menjelaskan tingkat empati anak. Tingkat empati secara spesifik berkorelasi negatif dengan waktu yang digunakan untuk aktivitas menonton (televisi, video, dan film) dan bermain video game. Semakin lama durasi anak bermain video game, maka skor *autism quotient (AQ)* juga meningkat. Dengan demikian, studi ini memberikan bukti empiris mengenai hubungan penggunaan media berbasis layar dengan karakteristik autisme pada anak. Durasi penggunaan media berbasis layar adalah prediktor yang siginifikan untuk tingkat sistemasi dan *extreme male brain behavior*, sedangkan tingkat berempati anak lebih dipengaruhi oleh jenis media. Hasil studi ini menyoroti pentingnya memperhatikan dampak dari penggunaan media berbasis layar pada anak.

Kata kunci: penggunaan media berbasis layar, *empathizing*, *systemizing*, karakteristik autisme, anak di Indonesia

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Starting from a young age, children in Indonesia have been utilizing screen-based media with the total time spent being more than one hour per day. Pandia et al. (2019) have raised the suspicion that this phenomenon is occurring in parallel with the rise in digital technology and smartphone usage in Indonesia. Screen-based media that have been used commonly include mobile phones (91.6%), followed by television (86.1%), and computers (61%). As for the functions, it is to improve knowledge and skills (61.5%), to obtain entertainment (55.7%), and to use for communication (34.4%). Mobile phones and tablets are the first screen-based media handled by most children in Indonesia since they were under one year old (Susilowati et al., 2021). Among school-age children, the consumption of screen-based media is increasing, to on average being more than two hours per day (Amelia & Ramdani, 2019). In general, children of three to eight years of age are spending at least one hour per sitting with one type of electronic media (theAsianparent Insight, 2014). The young onset of screen-based media use among Indonesian children is not surprising, as studies have found that, generally, most children have been interacting with digital media since four months of age (Chassiakos et al., 2016). The presence of tablets and smartphones has further increased the number of screen-time options for children (Nielsen, 2015), causing them to devote more time to screen activities (Roberts & Foehr, 2008).

The duration spent on screen-based media by Indonesian children is important to note because it exceeds the American Academy of Pediatric recommendations about healthy screen time limits (Committee on Public Education, American Academy of Pediatrics, 2001). It has been suggested that an appropriate screen consumption time for children is less than two hours (Council on Communications and Media et al., 2013). Realizing the vast variety of media available to their children in their daily lives, Indonesian parents have begun to voice concerns about the effects of media on their children (Hendriyani, 2013). Even though the parents are worrying about the effects of media on their children, a survey of 3,917 children aged between three and eight years in South East Asian countries found that Indonesian parents are allowing their children to use electronic devices more (compared to those of neighboring countries; theAsianparent Insight, 2014).

Sejak usia dini, anak di Indonesia telah menggunakan media berbasis layar dengan total waktu penggunaan lebih dari satu jam per hari. Pandia et al. (2019) menduga bahwa fenomena ini terjadi seiring dengan meningkatnya teknologi digital dan penggunaan *smartphone* di Indonesia. Media berbasis layar yang paling banyak digunakan adalah telepon genggam (91,6%), diikuti televisi (86,1%), dan komputer (61%). Adapun fungsinya adalah untuk meningkatkan pengetahuan dan keterampilan (61,5%), hiburan (55,7%), dan untuk komunikasi (34,4%). Ponsel dan tablet merupakan media berbasis layar yang pertama kali digunakan oleh sebagian besar anak di Indonesia sejak mereka berusia di bawah satu tahun (Susilowati et al., 2021). Di kalangan anak usia sekolah, konsumsi media berbasis layar semakin meningkat, hingga rerata lebih dari dua jam per hari (Amelia & Ramdani, 2019). Secara umum, anak usia tiga hingga delapan tahun menghabiskan setidaknya satu jam dengan satu jenis media elektronik di tiap pemakaian (theAsianparent Insight, 2014). Dininya penggunaan media berbasis layar di kalangan anak Indonesia tidak mengejutkan, karena sejumlah studi menemukan bahwa, umumnya, sebagian besar anak telah berinteraksi dengan media digital sejak usia empat bulan (Chassiakos et al., 2016). Kehadiran tablet dan *smartphone* semakin meningkatkan banyaknya pilihan waktu layar (*screen-time*) untuk anak (Nielsen, 2015), menyebabkan mereka meluangkan lebih banyak waktu untuk aktivitas layar (Roberts & Foehr, 2008).

Durasi yang dihabiskan untuk media berbasis layar oleh anak Indonesia perlu diperhatikan karena melebihi rekomendasi batas waktu layar yang sehat dari *American Academy of Pediatrics* (Committee on Public Education, American Academy of Pediatrics, 2001). Waktu layar yang disarankan untuk anak adalah kurang dari dua jam (Council on Communications and Media et al., 2013). Menyadari banyaknya variasi media yang tersedia bagi anak mereka dalam kehidupan sehari-hari, para orang tua Indonesia mulai menyuarakan keprihatinan tentang efek media pada anak (Hendriyani, 2013). Walaupun para orang tua khawatir tentang efek media pada anak mereka, sebuah survei terhadap 3.917 anak berusia antara tiga dan delapan tahun di sejumlah negara Asia Tenggara menemukan bahwa orang tua Indonesia lebih banyak mengizinkan anak mereka menggunakan perangkat elektronik (dibandingkan dengan negara sekitar; theAsianparent Insight, 2014).

In general, studies regarding screen-based media use's changing effects on children have been growing, due to the fact that screen technology mediates many children's developmental processes (Casale et al., 2016; Engelhardt & Mazurek, 2013; Ge et al., 2014; Wilson, 2008). The self-chosen preferences on media use by children may provide differential opportunities for the development of visual-spatial skills, achievement, initiative, self-regulation, and social skills (Cherney & London, 2006). Screen-based media has positively facilitated children's learning in several fields, for instance by stimulating visual perception, auditory perception, and symbolic representation and mediating imitation learning and word acquisition (Richert et al., 2011). However, media use is also followed by adverse effects (Sharif et al., 2010; Sisson et al., 2010). Due to the variety of reasons that can affect children, parental accompaniment and supervision is required when children are utilizing digital technologies (Pandia et al., 2019).

Published studies regarding media use reports of the duration of children that children spend on media may vary. The study conducted by Mazurek and Wenstrup (2013), which involved 179 children (aged 8-18 years) with typical development, finds that the average screen-time spent on watching television, gaming, and playing social media is reported to be 3.1 hours per day. Another study with a sample of 1,323 children (aged 6-12 years) established that children were spending 4.2 hours per day watching television and playing video games (Swing et al., 2010). Cross-sectional baseline study integrating studies from 2016-2018 on children's screen time (aged 9-10 years) across sociodemographic backgrounds has found that, on average, children reported 3.99 hours of screen time per day across six modalities (television shows, videos [e.g., YouTube], video games, social networking, texting, and video chat), with the most time spent watching or streaming television shows or movies (1.31 hours), playing video games (1.06 hours), and watching or streaming videos (1.05 hours; Nagata et al., 2022). From all these findings, it can be assumed that the time devoted by children on screen-based media is reaching four hours per day.

Worth noting is that the screen times being reported for children with average development are nearly approaching the screen times of children with Autistic Spectrum Disorder (ASD). Children with Autistic Spectrum Disorder (ASD) were reported to spend, on average, 4.5 hours per day engaged in screen-based

Secara umum, studi tentang efek perubahan penggunaan media berbasis layar pada anak terus berkembang, sebab teknologi layar memediasi banyak proses perkembangan pada anak (Casale et al., 2016; Engelhardt & Mazurek, 2013; Ge et al., 2014; Wilson, 2008). Preferensi penggunaan media yang dapat dipilih sendiri oleh anak dapat memberikan peluang yang berbeda untuk perkembangan keterampilan visual-spasial, prestasi, inisiatif, pengaturan diri, dan keterampilan sosial (Cherney & London, 2006). Media berbasis layar secara positif telah memfasilitasi pembelajaran anak di beberapa bidang, contohnya dengan merangsang persepsi visual, persepsi pendengaran, dan representasi simbolik serta memediasi pembelajaran imitasi dan penguasaan kata (Richert et al., 2011). Namun, penggunaan media juga diikuti dengan beberapa efek samping negatif (Sharif et al., 2010; Sisson et al., 2010). Dengan memperhitungkan berbagai alasan yang dapat mempengaruhi anak, pendampingan dan pengawasan orang tua diperlukan ketika anak menggunakan teknologi digital (Pandia et al., 2019).

Studi yang dipublikasikan mengenai laporan durasi penggunaan media yang dihabiskan anak di media cukup bervariasi. Studi yang dilakukan oleh Mazurek dan Wenstrup (2013), yang melibatkan 179 anak (usia 8-18 tahun) dengan perkembangan secara umum menemukan bahwa rata-rata *screen-time* yang dihabiskan untuk menonton televisi, bermain game, dan bermain media sosial dilaporkan mencapai 3,1 jam per hari. Studi lain dengan sampel 1.323 anak (usia 6-12 tahun) menemukan bahwa anak menghabiskan 4,2 jam per hari menonton televisi dan bermain video game (Swing et al., 2010). Studi *baseline cross-sectional* yang mengintegrasikan studi dari 2016-2018 terkait waktu layar anak (usia 9-10 tahun) dari berbagai latar belakang sosiodemografi telah menemukan bahwa secara rerata anak melaporkan waktu layar 3,99 jam per hari di enam modalitas (acara televisi, video [misalnya, YouTube], video game, jejaring sosial, pesan singkat, dan obrolan video), dengan waktu terbanyak dihabiskan untuk menonton atau *streaming* acara televisi atau film (1,31 jam), bermain video game (1,06 jam), dan menonton atau *streaming* video (1,05 jam; Nagata et al., 2022). Dari seluruh temuan tersebut, dapat diasumsikan bahwa waktu yang dihabiskan anak pada media berbasis layar mencapai empat jam per hari.

Perlu diperhatikan bahwa waktu layar yang dilaporkan untuk anak dengan perkembangan umum hampir mendekati waktu layar anak dengan *Autistic Spectrum Disorder (ASD)*. Anak dengan *Autistic Spectrum Disorder (ASD)* dilaporkan menghabiskan rerata 4,5 jam per hari dalam penggunaan media berbasis layar,

media use, as compared to an average of 2.8 hours per day in all specified non-screen activities combined (including reading, homework, studying, spending time with friends, and engaging in physical activity). It has been known that autistic individuals are strongly drawn in by screen-based media devices (Finkenauer et al., 2012; Mazurek & Engelhardt, 2013) and are more likely to spend most of their free time using them (Orsmond & Kuo, 2011). Given that Autistic Spectrum Disorder (ASD) children have a wealth of choices for screen-based media, they are also more likely to become addicted to electronic devices and to exhibit symptoms from relatively small amounts of exposure (Mazurek & Wenstrup, 2013). Autistic children prefer non-social screen activities such as video games and show lower rates of social media use, reflecting their dislike for social interaction; these rates are lower than other children's disability groups (speech or language impairment, learning disabilities, and intellectual disabilities; Mazurek et al., 2012).

In addition to the study results discussed previously, support is growing for the claim that exposure to screen time might be related to autism, though this claim has been largely overlooked in several studies. The 17% increase in the number of autism cases that followed the introduction of cable television in the '80s (Waldman et al., 2006) leads to the question of whether exposure to screen-time media has caused autism. A recent study involving 2152 typically developed children found that video viewing at 12 months was statistically associated with Autistic Spectrum Disorder (ASD)-like symptoms at two years of age. The study concluded that more early-age screen viewing was associated with more Autistic Spectrum Disorder (ASD)-like symptoms later on (Heffler et al., 2020). Moreover, according to a systematic review that covers 47 studies about media use among children and youths with Autistic Spectrum Disorder (ASD), it was indeed shown that children with Autistic Spectrum Disorder (ASD) have problematic use in video games or computer consumption compared with children without Autistic Spectrum Disorder (ASD). It was consistently observed that watching television of playing computer or video games are the favorite screen-based media activities among children with Autistic Spectrum Disorder (ASD; Stiller & Mößle, 2018). Other studies involving adults also finds that individuals with more autistic traits tend to be more compulsive in their Internet use than adults of typical development (Finkenauer et al., 2012). All of these findings have indicated that autism is linked closely to

dibandingkan dengan rerata 2,8 jam per hari dalam semua aktivitas non-layar tertentu (termasuk membaca, pekerjaan rumah, belajar, menghabiskan waktu bersama teman, dan aktivitas fisik). Telah diketahui bahwa individu autistik sangat tertarik dengan perangkat media berbasis layar (Finkenauer et al., 2012; Mazurek & Engelhardt, 2013) dan lebih cenderung menghabiskan sebagian besar waktu luang mereka untuk menggunakannya (Orsmond & Kuo, 2011). Mengingat bahwa anak dengan *Autistic Spectrum Disorder (ASD)* memiliki sangat banyak pilihan media berbasis layar, mereka juga cenderung kecanduan perangkat elektronik dan dapat menunjukkan gejala dari paparan yang relatif kecil (Mazurek & Wenstrup, 2013). Anak autistik lebih menyukai aktivitas layar non-sosial seperti *video game* dan menunjukkan tingkat penggunaan media sosial yang lebih rendah, yang mencerminkan ketidaksukaan mereka terhadap interaksi sosial; angka ini lebih rendah daripada kelompok disabilitas anak lainnya (gangguan bicara atau bahasa, gangguan belajar, dan disabilitas intelektual; Mazurek et al., 2012).

Selain hasil studi yang telah dibahas sebelumnya, dukungan terhadap klaim bahwa paparan waktu layar mungkin terkait dengan autisme semakin berkembang, meskipun klaim ini sebagian besar telah diabaikan dalam sejumlah studi. Pertanyaan yang timbul setelah adanya peningkatan 17% dalam jumlah kasus autisme yang mengikuti pengenalan televisi kabel di tahun 80-an (Waldman et al., 2006) adalah apakah paparan waktu layar turut menyebabkan autisme. Sebuah studi baru-baru ini yang melibatkan 2152 anak dengan perkembangan umum menemukan bahwa menonton video pada usia 12 bulan secara statistik dikaitkan dengan gejala yang menyerupai *Autistic Spectrum Disorder (ASD)* pada usia dua tahun. Studi tersebut menyimpulkan bahwa lebih banyak melihat layar pada usia dini dikaitkan dengan lebih banyak gejala seperti *Autistic Spectrum Disorder (ASD)* di kemudian hari (Heffler et al., 2020). Selain itu, menurut tinjauan sistematis yang mencakup 47 studi tentang penggunaan media di antara anak dan remaja dengan *Autistic Spectrum Disorder (ASD),* memang terbukti bahwa anak dengan *Autistic Spectrum Disorder (ASD)* memiliki masalah dalam penggunaan *video game* atau konsumsi komputer dibandingkan dengan anak tanpa *Autistic Spectrum Disorder (ASD)*. Secara konsisten, diamati bahwa menonton televisi atau bermain komputer atau *video game* adalah aktivitas media berbasis layar favorit di antara anak dengan *Autistic Spectrum Disorder* (*ASD*; Stiller & Mößle, 2018). Studi lain yang melibatkan orang dewasa juga menemukan bahwa individu dengan sifat autistik cenderung lebih kompulsif dalam penggunaan Internet

strong media use and raised the question whether screen-based media use might be contributed to specific autism-like characteristic in typically developed children, considering than the typically developed children seem to exhibit similar duration of screen-time.

Convincing evidence that suggests screen-based media predicting autistic features exists. Repetitive screen stimulation has been reported to produce hyperarousal, which boosts visual sensory overstimulation in children. The overstimulation occurs due to the blue light radiation compounded by the screen size, precision of the picture, and the speed of visual stimuli effects that make the visual system under tension (Dunckley, 2015). Therefore, the screen could alter the course of normal visual learning and processing, allowing the viewer to become more focused on detail (Schmidt & Vandewater, 2008). Studies have also found that repeated exposure to cinematic codes presented on film, such as the zoom technique, leads to higher scores on search tasks that require children to find detail in the complex display. In short, changing the visual-spatial ability (Salomon, 1979; Schmidt & Vandewater, 2008). Moreover, activities like gaming and watching television elevate the ability in children to track detail among distractor items, locate it more quickly, and process the visual information more efficiently (Green & Bavelier, 2003; Schmidt & Vandewater, 2008).

Regarding social interaction, researchers argue that media use has increasingly impaired social behavior in children (Tanimura et al., 2007). Media use starting from a young age impairs children's ability to achieve joint attention, a critical foundation for social interaction. This impairment results from the fact that children are looking at a fixed viewing point when looking at the screen, thereby completely disconnecting them from the surrounding social and physical world (Charman, 2003). For example, gaming precludes social connection among game players, resulting in increase in levels of depression, anxiety, and social phobia (Gentile et al., 2011).

The sheer quantity, as well as the nature of media content, could challenge children's ability to exercise empathy. The screen-based media use has been reported

mereka daripada orang dewasa dengan perkembangan umum (Finkenauer et al., 2012). Semua temuan ini menunjukkan bahwa autisme terkait erat dengan penggunaan media yang kuat dan menimbulkan pertanyaan apakah penggunaan media berbasis layar dapat berkontribusi pada karakteristik yang serupa dengan autisme tertentu pada anak dengan perkembangan umum, mengingat bahwa anak dengan perkembangan umum tampak menunjukkan durasi waktu layar yang sama.

Terdapat temuan kuat yang menunjukkan adanya prediksi gejala autistik dari media berbasis layar. Stimulasi layar berulang telah dilaporkan memicu *hyperarousal*, yang meningkatkan stimulasi berlebihan sensorik visual pada anak. Overstimulasi terjadi karena radiasi cahaya biru yang diperparah oleh ukuran layar, presisi gambar, dan kecepatan efek rangsangan visual yang membuat sistem visual menjadi tegang (Duckley, 2015). Maka dari itu, layar dapat mengubah cara kerja pembelajaran dan pemrosesan visual yang normal, memungkinkan penonton menjadi lebih fokus pada detail (Schmidt & Vandewater, 2008). Studi juga menemukan bahwa paparan berulang terhadap kode sinematik yang disajikan pada film, seperti teknik *zoom*, menghasilkan skor yang lebih tinggi pada tugas pencarian yang mengharuskan anak menemukan detail dalam tampilan yang kompleks. Singkatnya, hal ini mengubah kemampuan visual-spasial (Salomon, 1979; Schmidt & Vandewater, 2008). Selain itu, aktivitas seperti bermain *game* dan menonton televisi meningkatkan kemampuan anak untuk melacak detail di antara poin yang mengganggu, menemukannya lebih cepat, dan memproses informasi visual dengan lebih efisien (Green & Bavelier, 2003; Schmidt & Vandewater, 2008).

Terkait interaksi sosial, peneliti berpendapat bahwa penggunaan media semakin berdampak buruk pada perilaku sosial anak (Tanimura et al., 2007). Penggunaan media mulai dari usia muda merusak kemampuan anak untuk mencapai perhatian bersama, landasan penting untuk interaksi sosial. Gangguan ini diakibatkan oleh fakta bahwa anak melihat pada titik pandang tetap saat melihat layar, sehingga memutuskan hubungan mereka dari dunia sosial dan fisik di sekitarnya (Charman, 2003). Sebagai contoh, *game* menghalangi hubungan sosial di antara pemain *game*, yang berujung pada peningkatan taraf depresi, kecemasan, dan fobia sosial (Gentile et al., 2011).

Kuantitas, serta sifat konten media, dapat menantang kemampuan anak untuk melatih empati. Penggunaan media berbasis layar telah dilaporkan membatasi

to limit empathy skills in children, whereas being empathetic and able to share emotions with others is part of what makes children effective social agents (Findlay et al., 2006). A recent literature review also suggests that the more duration of screen time in children results in less ability to read facial cues, reduced empathy, and impaired communication (Westby, 2021). The effects of screen technologies on empathy in children are empirically proved by the experiment on screen diet. According to the experiment, sixth-grade children who receive a screen diet within five days have shown better ability to recognize emotion, compared to children who routinely engage with screen technologies. This indicated that detachment from screen activities significantly affects the enhancement of empathy levels. Moreover, neuroscience has proven that the usage of screen-based media damages the insula, the part of the brain that regulates empathetic emotion, bolstering the argument that screen-based media are strongly correlated with the empathy function (Dunckley, 2015).

On the basis of the evidence currently available, it seems fair to suggest that, though screen-based media use increases the ability to notice detail, it blocks social interaction; these characteristics seem to reflect the Autistic Spectrum Disorder (ASD) features. The Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-V) points out the three core diagnostic features of Autistic Spectrum Disorder (ASD), i.e., the deficit in social communication and social interaction and restricted, repetitive patterns of behavior, interests, or activities (American Psychiatric Association, DSM-5 Task Force, 2013). From the cognitive perspective, Autistic Spectrum Disorder (ASD) reflects masculinized cognitive traits, characterized by delays and deficits in empathy, while intact or even superior systemizing skills are its area of strength. These cognitive traits refer to the extreme male brain condition of autism (Baron-Cohen, 2002).

The term "extreme male brain condition" in autism proposes a distinction between the male and female brains, which are divided by the aspects of "empathizing and systemizing". To further explain the concept of empathizing and systemizing concept, the authors refer to the Empathizing-Systemizing (E-S) Theory (Baron-Cohen, 2009). In a neuroscience perspective, the Empathizing-Systemizing (E-S) Theory explains the psychological models in impairments of executive function which show by an abnormality in brain regions, characterized by low activity on social cognition part of

keterampilan empati pada anak, sedangkan kemampuan empati dan mampu berbagi emosi dengan orang lain adalah bagian dari apa yang membuat anak menjadi agen sosial yang efektif (Findlay et al., 2006). Tinjauan literatur terkini juga menunjukkan bahwa semakin tinggi durasi waktu layar pada anak mengakibatkan semakin menurunnya kemampuan membaca isyarat wajah, berkurangnya empati, dan gangguan komunikasi (Westby, 2021). Efek teknologi layar pada empati anak dibuktikan secara empiris dengan eksperimen *screen diet*. Menurut eksperimen ini, anak Kelas VI yang menerima *screen diet* dalam lima hari menunjukkan kemampuan yang lebih baik untuk mengenali emosi, dibandingkan dengan anak yang secara rutin terpapar teknologi layar. Hal ini menunjukkan bahwa penghentian aktivitas layar secara signifikan berpengaruh pada peningkatan empati. Selain itu, ilmu saraf telah membuktikan bahwa penggunaan media berbasis layar merusak insula, bagian otak yang mengatur emosi empati, memperkuat argumen bahwa media berbasis layar berkorelasi kuat dengan fungsi empati (Dunckley, 2015).

Berdasarkan bukti yang ada saat ini, dapat dikatakan bahwa meskipun penggunaan media berbasis layar meningkatkan kemampuan untuk memperhatikan detail, hal itu menghalangi interaksi sosial; karakteristik ini tampaknya mencerminkan fitur *Autistic Spectrum Disorder (ASD)*. *Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-V)* menjelaskan tiga fitur diagnostik inti dari *Autistic Spectrum Disorder (ASD),* yaitu: defisit dalam komunikasi sosial dan interaksi sosial dan pola perilaku, minat yang terbatas dan berulang, atau dalam aktivitas (American Psychiatric Association, DSM-5 Task Force, 2013). Dari perspektif kognitif, *Autistic Spectrum Disorder (ASD)* mencerminkan ciri kognitif maskulin, yang ditandai dengan keterlambatan dan kekurangan berempati, sementara keterampilan sistemisasi yang utuh atau bahkan unggul adalah area kelebihannya. Ciri kognitif ini merujuk pada kondisi otak autisme laki-laki yang ekstrim (Baron-Cohen, 2002).

Istilah "kondisi otak laki-laki yang ekstrim" dalam autisme merujuk pada perbedaan antara otak laki-laki dan perempuan yang dibagi oleh aspek "empati dan sistematisasi". Untuk lebih menjelaskan konsep empati dan sistematisasi, penulis mengacu pada *Empathizing-Systemizing (E-S) Theory* (Baron-Cohen, 2009). Dalam perspektif ilmu saraf, *Empathizing-Systemizing (E-S) Theory* menjelaskan model psikologis dalam gangguan fungsi eksekutif yang ditunjukkan oleh kelainan di area otak, ditandai dengan aktivitas rendah pada bagian kognisi sosial otak dan diiringi aktivitas pemrosesan

the brain along with abnormally high activity on perceptual processing - a pattern resulting from the unbalanced functional connectivity (Baron-Cohen & Belmonte, 2005).

In regards to behavior, empathizing manifests in the ability to understand others' mental states and drives an individual to respond to that mental state with the appropriate emotion. Empathizing allows people to care about how other people feel and predict the future behavior of others with whom they interact. A different process, systemizing, is conceptualized as the drive to understand and derive rules about a system (Baron-Cohen, 2002). Superior systemizing abilities allow an individual to control and predict how the system will behave. These systems might include any kind of system in the environment: (1) technical systems (e.g., machines and tools); (2) natural systems (e.g., weather patterns); (3) abstract systems (e.g., mathematics or computer programs); (4) mechanical systems (e.g., video recorders or window locks); (5) numerical systems (e.g., a train timetable or a calendar); (6) social systems (e.g., a management hierarchy); and (7) motoric systems (e.g., throwing a Frisbee or bouncing on a trampoline) (Baron-Cohen, 2006).

In the assessment of both the empathizing and systemizing traits, females usually score higher than males, whereas individuals with autism score lower than typical males for empathizing, demonstrating that autistic individuals have an extremely low Empathy Quotient (EQ) score. Meanwhile, males scored higher than females for the Systemizing Quotient (SQ), but autistic individuals scored even higher than average males, suggesting that autistic individuals have superior systemizing traits, such as attention to detail and strict obsessions with closed systems (Baron-Cohen, 2002). Hence, systemizing behavior is more in line with the male brain, while empathizing behavior is more associated with the female brain.

Due to the fact that Autistic Spectrum Disorder (ASD) individuals are best explained not just by referencing to a below average empathy but also to hyper-systemizing, the discrepancy between systemize (S) and empathy (E) determines if individuals likely to develop Autistic Spectrum Disorder (ASD) traits (Baron-Cohen, 2010). The difference between empathy

persepsi yang tinggi secara tidak normal - pola yang merupakan hasil dari konektivitas fungsional yang tidak seimbang (Baron-Cohen & Belmonte, 2005).

Sehubungan dengan perilaku, empati terwujud dalam kemampuan memahami kondisi mental orang lain dan mendorong seseorang untuk merespon kondisi mental tersebut dengan emosi yang sesuai. Berempati memungkinkan seseorang untuk peduli tentang bagaimana perasaan orang lain dan memprediksi perilaku masa depan orang yang berinteraksi dengan mereka. Proses yang berbeda, sistemisasi, dikonseptualisasikan sebagai dorongan untuk memahami dan mendapatkan aturan tentang suatu sistem (Baron-Cohen, 2002). Kemampuan sistemisasi yang baik memungkinkan seseorang untuk mengontrol dan memprediksi bagaimana sistem akan bekerja. Sistem ini mungkin termasuk segala jenis sistem di lingkungan: (1) sistem teknis (misalnya: mesin dan peralatan); (2) sistem alam (misalnya: pola cuaca); (3) sistem abstrak (misalnya: matematika atau program komputer); (4) sistem mekanis (misalnya: perekam video atau kunci jendela); (5) sistem numerik (misalnya: jadwal kereta api atau kalender); (6) sistem sosial (misalnya: hierarki manajemen); dan (7) sistem motorik (misalnya: melempar *Frisbee* atau loncat di atas trampolin) (Baron-Cohen, 2006).

Dalam penilaian sifat berempati dan sistematis, perempuan cenderung menunjukkan skor lebih tinggi daripada laki-laki, sedangkan individu dengan autisme menunjukkan skor lebih rendah daripada laki-laki umum dalam berempati, menunjukkan bahwa individu dengan autisme memiliki skor *Empathy Quotient (EQ)* yang sangat rendah. Sementara itu, laki-laki mendapat skor lebih tinggi daripada perempuan untuk *Systemizing Quotient (SQ)*, tetapi individu autistik mendapat skor lebih tinggi daripada rerata laki-laki, menunjukkan bahwa individu dengan autisme memiliki kemampuan sistemisasi yang unggul, seperti perhatian terhadap detail dan obsesi ketat dengan sistem tertutup (Baron-Cohen, 2002). Maka dari itu, perilaku sistematis lebih sejalan dengan otak laki-laki, sedangkan perilaku berempati lebih terkait dengan otak perempuan.

Fakta bahwa individu dengan *Autistic Spectrum Disorder (ASD)* dapat dijelaskan tidak hanya dengan mengacu pada empati di bawah rerata tetapi juga hiper-sistemisasi, perbedaan antara *systemize (S)* dan *empathy (E)* menentukan apakah individu memiliki kecenderungan akan ciri *Autistic Spectrum Disorder* (*ASD*; Baron-Cohen, 2010). Perbedaan antara *empathy (E)* dan *systemize (S)*

(E) and systemize (S) is formulated as the D-Score. If the D-Score is obtained from a higher systemize (S) than empathy (E), the D-Score will reflect high systemizing. Conversely, if the D-Score is obtained from a higher empathy (E) than systemize (S), the D-Score will reflect high empathizing. Therefore, a high D-Score can be obtained either by being good at systemizing or poor at empathizing, or both (Goldenfeld et al., 2005). The different D-Scores are reflected in five different brain types: (1) male typical brain (S > E); (2) female typical brain (E > S); (3) extreme male brain (SS >> EE); (4) extreme female brain (EE >> SS); and (5) balanced (E = S; Baron-Cohen et al., 2005; Goldenfeld et al., 2005).

Apart from the empathizing and systemizing concepts, the global autistic features are being examined under the term of Autistic Spectrum Quotient (AQ). The Autistic Spectrum Quotient (AQ) was covered the deficit aspects in autistic children: (1) communication; (2) social skills; (3) attention switching; (4) attention to detail; and (5) imagination (Baron-Cohen et al., 2001). The Autistic Spectrum Quotient (AQ) has been considered a valuable instrument for rapidly assessing where an individual is situated on the continuum from autism to normality; hence, it is applicable for a typically developing individual (Baron-Cohen et al., 2001). It has been confirmed that autistic traits may be present in the general population, hence autistic traits are not only considered as a clinical condition (Constantino & Todd, 2003; Posserud et al., 2006; Wing, 1988). An individual with autistic traits shares common symptoms of Autistic Spectrum Disorder (ASD), such as limited social skills and narrow interests, but not as extreme as those that characterizes Autistic Spectrum Disorder (ASD). Therefore, healthy population also shares several of the autistic characteristics that the clinical population does (Hoekstra et al., 2011).

The variables measured by the Autistic Spectrum Quotient (AQ) are relatively identical with the Empathizing-Systemizing (E-S) Theory covering both the social and cognitive traits. A factor analysis study conducted by Grove et al. (2013) discovered that the Autistic Spectrum Quotient (AQ) score loaded on the empathizing factors, whereas attention to detail loaded on systemizing factors, indicating the connection between Empathizing-Systemizing (E-S) Theory and Autistic Spectrum Quotient (AQ). Similar with the findings from the Empathizing-Systemizing (E-S) theory, males' Autistic Spectrum Quotient (AQ) scores are slightly higher than those of females (Ruzich et al.,

dirumuskan sebagai *D-Score*. Jika *D-Score* yang diperoleh dari *systemize (S)* yang lebih tinggi daripada *empathy (E)*, maka *D-Score* akan mencerminkan *systemizing* yang tinggi. Sebaliknya, jika *D-Score* diperoleh dari *empathy (E)* lebih tinggi daripada *systemize (S)*, *D-Score* akan mencerminkan empati yang tinggi. Maka dari itu, *D-Score* yang tinggi dapat diperoleh dengan menjadi baik dalam sistemisasi atau kurang dalam berempati, atau keduanya (Goldenfeld et al., 2005). *D-Score* yang berbeda tercermin dalam lima tipe otak yang berbeda: (1) otak tipikal laki-laki (*S > E*); (2) otak tipikal perempuan (*E > S*); (3) otak laki-laki ekstrim (*SS >> EE*); (4) otak perempuan ekstrim (*EE >> SS*); dan (5) seimbang (*E = S*; Baron-Cohen et al., 2005; Goldenfeld et al., 2005).

Terlepas dari konsep empati dan sistemisasi, fitur autisme global masih dikaji di bawah istilah *Autistic Spectrum Quotient (AQ)*. *Autistic Spectrum Quotient (AQ)* meliputi aspek defisit pada anak autistik, seperti: (1) komunikasi; (2) keterampilan sosial; (3) pengalihan perhatian; (4) perhatian terhadap detail; dan (5) imajinasi (Baron-Cohen et al., 2001). *Autistic Spectrum Quotient (AQ)* telah dianggap sebagai instrumen yang sangat berguna untuk menilai dengan cepat di mana seseorang berada pada kontinuum autisme hingga normalitas; karenanya, ini berlaku untuk individu dengan perkembangan umum (Baron-Cohen et al., 2001). Telah dikonfirmasi bahwa ciri autistik mungkin sudah ada pada populasi umum, sehingga ciri autistik tidak hanya dianggap sebagai kondisi klinis (Constantino & Todd, 2003; Posserud et al., 2006; Wing, 1988). Seorang individu dengan ciri autistik memiliki gejala yang menyerupai gejala umum *Autistic Spectrum Disorder (ASD)*, seperti keterampilan sosial yang terbatas dan minat yang sempit, tetapi tidak ekstrim seperti yang mencirikan *Autistic Spectrum Disorder (ASD)*. Maka dari itu, populasi yang sehat juga memiliki beberapa karakteristik autistik yang dimiliki populasi klinis (Hoekstra et al., 2011).

Variabel yang diukur dengan *Autistic Spectrum Quotient (AQ)* relatif identik dengan *Empathizing-Systemizing (E-S) Theory* yang mencakup sifat sosial dan kognitif. Sebuah studi analisis faktor yang dilakukan oleh Grove et al. (2013) menemukan bahwa skor *Autistic Spectrum Quotient (AQ)* dimuat pada faktor empati, sedangkan perhatian terhadap detail dimuat pada faktor sistemisasi, menunjukkan hubungan antara *Empathizing-Systemizing (E-S) Theory* dan *Autistic Spectrum Quotient (AQ)*. Sama halnya dengan temuan dari *Empathizing-Systemizing (E-S) Theory*, skor *Autistic Spectrum Quotient (AQ)* laki-laki sedikit lebih tinggi dibandingkan perempuan (Ruzich et al., 2015). Fakta bahwa laki-laki memiliki sifat

2015). The fact that males have higher autistic traits than females bolsters the fact that Autistic Spectrum Disorder (ASD) cases occurred far more often in males than in females, indicating that sex-differential genetic and hormonal factors may contribute to the findings (Werling & Geschwind, 2013).

To sum up, the close link between screen-based media use and several autistic characteristics, together with the fact that autistic individuals are engaged vigorously with these electronic devices, has raised the question of whether screen-based media use contributes to instances of autism. Meanwhile, there has been relatively little research that tries to prove how the usage of modern electronic media use and autistic traits in children, especially in Indonesia. There is an urge to find whether screen time is truly related to the development of autism, since most studies did not measure the autism traits itself but more to measuring the specific characteristic that might be related to autism, partially. Therefore, the study on media use and its link to autism did not seem comprehensive enough. Even though screen-based media use causes the worst effects in individuals with autism, these effects occur in all of us, including typically developing children. Moreover, scholars continue to seek the cause of the gradual escalation of autism prevalence over time, to the point where today, the instances total around 30-60 cases per 10,000, as opposed to 40 years ago when only about four cases were reported per 10,000 (Rutter, 2005). Nevertheless, recent autism studies are still seeking to find the causes of autism and ascertain other confounding environmental factors in autism (Mazurek et al., 2012). Environmental risk factors may contribute to the prevalence of Autistic Spectrum Disorder (ASD), perhaps via a complex interaction between genes and the environment, but none of the specific exposure effects have been identified in the targeted population (Newschaffer et al., 2007).

Given the gap in the study literatures, this study attempted to validate whether screen-based media use relates to autism. This study is addressed to the typically developing child, to see if the duration of time spent on screen-based media will increase the level of autistic traits, as well as to determine its relationship to both the systemizing (S) score and the empathy (E) score. This study focuses on the typically developed children as the subjects to really see the effect of screen-based media use on the emergence of autistic traits among children,

autis yang lebih tinggi daripada perempuan memperkuat fakta bahwa kasus *Autistic Spectrum Disorder (ASD)* terjadi jauh lebih sering pada laki-laki daripada perempuan, yang menunjukkan bahwa faktor genetik dan hormonal dari jenis kelamin dapat berkontribusi pada temuan ini (Werling & Geschwind, 2013).

Sebagai kesimpulan, hubungan erat antara penggunaan media berbasis layar dan beberapa karakteristik autistik, bersama dengan fakta bahwa individu autistik terlibat aktif dengan perangkat elektronik ini, telah menimbulkan pertanyaan apakah penggunaan media berbasis layar berkontribusi terhadap tingkat kejadian autisme. Sementara itu, relatif sedikit penelitian yang berupaya membuktikan bagaimana penggunaan media elektronik modern dan ciri autistik pada anak, khususnya di Indonesia. Ada dorongan untuk mencari tahu apakah waktu layar benar terkait dengan perkembangan autisme, karena sebagian besar studi tidak mengukur ciri autisme itu sendiri tetapi lebih untuk mengukur karakteristik spesifik yang mungkin terkait dengan autisme, secara parsial. Maka dari itu, kajian tentang penggunaan media dan kaitannya dengan autisme tampak belum cukup komprehensif. Meskipun penggunaan media berbasis layar memicu efek negatif pada individu dengan autisme, efek ini terjadi pada kita semua, termasuk anak yang sedang berkembang. Selain itu, para ilmuwan terus mencari penyebab peningkatan prevalensi autisme secara bertahap dari waktu ke waktu, hinggi titik prevalensi terkini, terdapat total kasus sekitar 30-60 kasus per 10.000 individu, dibandingkan dengan 40 tahun yang lalu ketika hanya sekitar empat kasus yang dilaporkan per 10.000 individu (Rutter, 2005). Walaupun demikian, studi autisme baru-baru ini masih mencari penyebab autisme dan memastikan faktor lingkungan tak terduga lainnya dalam autisme (Mazurek et al., 2012). Faktor risiko lingkungan dapat berkontribusi pada prevalensi *Autistic Spectrum Disorder (ASD)*, mungkin melalui interaksi kompleks antara genetika dan lingkungan, tetapi tidak ada efek paparan tertentu yang telah diidentifikasi pada populasi target (Newschaffer et al., 2007).

Mengingat adanya celah dalam literatur, studi ini berupaya untuk memvalidasi apakah penggunaan media berbasis layar berhubungan dengan autisme. Studi ini ditujukan kepada anak dengan perkembangan umum, untuk melihat apakah durasi waktu yang dihabiskan di media berbasis layar akan meningkatkan tingkat ciri-ciri autistik, serta untuk menentukan hubungannya dengan skor *systemize (S)* dan *empathy (E)*. Studi ini fokus pada anak dengan perkembangan umum sebagai subjek utama, untuk melihat efek penggunaan media berbasis layar

considering higher screen time has been argued to be associated with the development of autism. Autistic traits in children are quantified through the Autism Spectrum Quotient: Children's Version (AQ-Child; Auyeung et al., 2008), while empathizing and systemizing are measured by Empathy Quotient for Children (EQ-C) and Systemizing Quotient for Children (SQ-C) scales (Auyeung et al., 2009). Therefore, the aim of the present study is to investigate whether the duration of Indonesian children's screen-based media use correlates with their level of systemizing and empathizing and their autistic traits. Thus, this study is driven by the following research questions: (1) Does the time spent on screen-based media use by Indonesian children correlate negatively with Empathy Quotient (EQ)?; (2) Does the time spent on screen-based media use by Indonesian children correlate positively with Systemizing Quotient (SQ)?; (3) Does the time spent on screen-based media use correlate positively with extreme male brain behavior (D-Score)?; (4) Does the time spent on screen-based media use correlate positively with autistic traits or Autistic Spectrum Quotient (AQ)?

terhadap munculnya sifat autistik di antara anak, mengingat waktu layar yang lebih tinggi telah dikaitkan dengan perkembangan gejala autisme. Sifat autistik pada anak dikuantifikasi melalui *Autism Spectrum Quotient: Children's Version* (*AQ-Child*; Auyeung et al., 2008), sedangkan empati dan sistemisasi diukur dengan *Empathy Quotient for Children (EQ-C)* dan *Systemizing Quotient for Children (SQ-C)* (Auyeung et al., 2009). Maka dari itu, tujuan dari studi ini adalah menyelidiki apakah durasi penggunaan media berbasis layar anak Indonesia berkorelasi dengan tingkat sistemisasi dan empati serta ciri autistik. Dengan demikian, penelitian ini didorong oleh pertanyaan penelitian berikut: (1) Apakah waktu yang dihabiskan untuk penggunaan media berbasis layar oleh anak Indonesia berkorelasi negatif dengan *Empathy Quotient (EQ)*?; (2) Apakah waktu penggunaan media berbasis layar oleh anak Indonesia berkorelasi positif dengan *Systemizing Quotient (SQ)*?; (3) Apakah waktu yang dihabiskan untuk penggunaan media berbasis layar berkorelasi positif dengan perilaku otak laki-laki yang ekstrim (*D-Score*)?; (4) Apakah waktu yang dihabiskan untuk penggunaan media berbasis layar berkorelasi positif dengan sifat autistik atau *Autistic Spectrum Quotient (AQ)*?

Method

Participants

Sample size calculation was conducted to obtain the minimum number of samples required for this study. The calculation utilized G*Power 3.1.9.7 Statistical Power Analysis for Windows, with a 5% confidence interval and 95% confidence level as its parameters. According to the statistical power analysis, a minimum of 42 participants is required for this study. Parents were recruited from seven primary schools in Indonesia trough accidental sampling. All parents of the children in the participating schools received an information letter about the study and an informed consent form. If the parents were willing to participate in the study, they must hand in the signed informed consent form to the teachers, to then receive the study questionnaires. The measurement scales were completed by parents who were familiar with and able to report the screen habits of their child. Hence, the questionnaires were completed by either the mother or the father of the children.

Based on data collection, the study sample consisted of 207 parents in Indonesia who had children aged 4-6 years old and 10-12 years old, who were willing to

Metode

Partisipan

Perhitungan jumlah sampel dilakukan untuk menentukan jumlah sampel minimum yang diperlukan untuk studi ini. Perhitungan tersebut menggunakan *G*Power 3.1.9.7 Statistical Power Analysis for Windows*, dengan *confidence interval* 5% dan *confidence level* 95% sebagai parameternya. Menurut *power analysis*, minimal 42 peserta diperlukan untuk studi ini. Orang tua direkrut dari tujuh sekolah dasar (SD) di Indonesia melalui sampling aksidental. Semua orang tua dari anak di sekolah yang berpartisipasi menerima surat informasi tentang studi dan formulir persetujuan. Jika orang tua bersedia untuk berpartisipasi dalam studi ini, mereka harus menyerahkan formulir persetujuan yang telah ditandatangani kepada guru, untuk kemudian menerima kuesioner studi. Skala pengukuran diselesaikan oleh orang tua yang paham dan mampu melaporkan kebiasaan penggunaan layar pada anak mereka. Maka dari itu, kuesioner diisi oleh ibu atau ayah dari anak tersebut.

Berdasarkan pengumpulan data, sampel studi terdiri dari 207 orang tua di Indonesia yang memiliki anak usia 4-6 tahun dan 10-12 tahun, yang bersedia mengikuti

participate in this study. The children were divided into a younger age group (aged 4-6 years; *n* = 111, with 58 girls and 53 boys) with a mean age of 4.82 (*SD* = .81) and an older age group (aged 10-12 years; *n* = 96, with 63 girls and 33 boys) with a mean age of 11.01 (*SD* = .83). Children diagnosed with autism or other developmental disorders were excluded from this study.

Materials

Parents completed a demographic and history form designed for the purpose of the study to provide information about their child (age, gender, diagnostic information) and family variables (educational background and occupation of parents). After parents completed the form, three measurement scales were utilized to examine the aim of the research, being (1) the Screen-Based Media Use Survey; (2) the Empathizing-Systemizing Quotient for Children (EQ-SQ-C); and (3) the Autistic Spectrum Quotient: Children's Version (AQ-Child). As these scales were administered to Indonesian participants, all scales were translated and validated into Bahasa Indonesia since no Bahasa Indonesia version of the Empathizing-Systemizing Quotient for Children (EQ-SQ-C) and Autistic Spectrum Quotient: Children's Version (AQ-Child) were available, according to publisher. The translation of the scales follows the translation steps of scale adaptation (Peneva et al., 2014). According to the steps, the translation starts by adjusting the test vocabulary and grammar to the age and socio-cultural characteristics of the population to be tested. The precision of the translation is enforced by at least two translations, and after discussion, a common version is established. Finally, a group of professionals including the authors (as the researchers) and psychologists performs the final evaluation to ensure substantial and psychological equivalence with the original version.

The translation of the instruments was checked independently by three Bahasa Indonesia-English bilingual reviewers with expertise in psychometric and developmental psychology. Therefore, the final Bahasa Indonesia versions of the Empathy Quotient for Children (EQ-C), Systemizing Quotient for Children (SQ-C), and Autistic Spectrum Quotient: Children's Version (AQ-Child) were comparable to the original English versions. After passing the meaning verification based on a psychological perspective, a pilot test was administered to 10 Indonesian parents who represented both low and high educational backgrounds. The

studi ini. Anak dibagi menjadi kelompok usia yang lebih muda (usia 4-6 tahun; *n* = 111, dengan 58 perempuan dan 53 laki-laki) dengan usia rerata 4,82 (*SD* = 0,81) dan kelompok usia yang lebih tua (usia 10-12 tahun; *n* = 96, dengan 63 perempuan dan 33 laki-laki) dengan usia rerata 11,01 (*SD* = 0,83). Anak yang didiagnosis dengan autisme atau gangguan perkembangan lainnya tidak dimasukkan dalam studi ini.

Materi

Orang tua mengisi formulir demografi dan riwayat yang disusun untuk tujuan studi guna memberikan informasi tentang anak mereka (usia, jenis kelamin, informasi diagnostik) dan variabel keluarga (latar belakang pendidikan dan pekerjaan orang tua). Setelah orang tua mengisi formulir, tiga skala pengukuran digunakan untuk mengkaji tujuan studi, yaitu: (1) *Screen-Based Media Use Survey*; (2) *Empathizing-Systemizing Quotient for Children (EQ-SQ-C)*; dan (3) *Autistic Spectrum Quotient: Children's Version (AQ-Child)*. Karena skala ini diberikan kepada peserta Indonesia, semua skala diterjemahkan dan divalidasi ke dalam Bahasa Indonesia karena versi Bahasa Indonesia dari *Empathizing-Systemizing Quotient for Children (EQ-SQ-C)* dan *Autistic Spectrum Quotient: Children's Version (AQ-Child)* tidak tersedia, menurut penerbit. Translasi skala mengikuti langkah translasi adaptasi skala (Peneva et al., 2014). Menurut langkah tersebut, penerjemahan dimulai dengan menyesuaikan kosa kata dan tata bahasa tes dengan usia dan karakteristik sosial budaya populasi yang akan diuji. Ketepatan terjemahan ditegakkan oleh setidaknya dua terjemahan, dan setelah diskusi, versi umum ditetapkan. Terakhir, sekelompok profesional termasuk penulis (sebagai peneliti) dan psikolog melakukan evaluasi akhir untuk memastikan kesepadanan substansial dan psikologis dengan versi aslinya.

Terjemahan instrumen diperiksa secara independen oleh tiga *reviewer* bilingual dalam Bahasa Indonesia-Bahasa Inggris dengan keahlian di bidang psikometri dan psikologi perkembangan. Maka dari itu, versi final Bahasa Indonesia dari *Empathy Quotient for Children (EQ-C)*, *Systemizing Quotient for Children (SQ-C)*, dan *Autistic Spectrum Quotient: Children's Version (AQ-Child)* dapat dibandingkan dengan versi aslinya dalam Bahasa Inggris. Setelah lolos verifikasi makna berdasarkan perspektif psikologis, uji coba diberikan kepada 10 orang tua Indonesia yang mewakili latar belakang pendidikan rendah dan tinggi.

inclusion of parents with varying levels of educational backgrounds helped to prevent ambiguous interpretation by, ensuring that the test instructions and content were easily understood by all parents taking the pilot test. A final draft of the Bahasa Indonesia version was released after the parents' feedback was incorporated.

Screen-Based Media Use Survey

The Screen-Based Media Use Survey examines the average amount of time children spent on screen-based media use. The survey is completed by the parents, and adopts the survey of Mazurek and Wenstrup (2013), which asks about the general time spent by children on their daily life activities outside of school during weekdays and weekends, consisting of: (1) "reading for pleasure"; (2) "doing homework or studying"; (3) "spending time with friends"; (4) "playing sports or other physical activity"; (5) "watching television"; (6) "playing video or computer games"; and (7) "using email, Facebook, or texting".

According to Straker et al. (2013), "screen-based media" is a term used to describe screen-based activity such as using computers (for schoolwork, games, and social networking) and playing electronic games. Then, "screen time" is defined as the time spent viewing a screen or using any equipment with a screen, including a televisions, digital video or versatile discs (DVDs), video games, and computers. Nowadays, this term has been broadened to include hand-held devices or other visual devices. In this study, the authors adjusted the prior survey by Mazurek and Wenstrup (2013), focusing only on screen-based media activities during both weekday and weekend such as: (1) watching television, videos, and movies; (2) playing video games; (3) engaging in social media; (4) Internet browsing; and (5) working on homework. The authors also informed the parents that the type of media utilized was not limited to any screen-based technologies, but also included handheld devices, e.g., smartphones and tablets, which might be handled by the children.

Parents should provide their responses according to a six-point scale reporting their children daily screen-time duration, ranging from: "0 (*None at All*)"; "1 (*Less than 0.5 Hours*)"; "2 (*More than 0.5-1 Hours*)"; "3 (*More than 1-2.5 Hours*)"; "4 (*More than 2.5-4 Hours*)"; and "5 (*More than 4 Hours*)". Consistent with previous

Diikutsertakannya orang tua dengan berbagai tingkat latar belakang pendidikan membantu mencegah interpretasi yang ambigu dengan memastikan bahwa instruksi dan konten tes mudah dipahami oleh semua orang tua yang mengikuti tes uji coba. Draf final versi Bahasa Indonesia dirilis setelah masukan orang tua dimasukkan.

Screen-Based Media Use Survey

Screen-Based Media Use Survey melihat rerata waktu yang dihabiskan anak dalam penggunaan media berbasis layar. Survei tersebut diisi oleh orang tua, dan mengadopsi survei dari Mazurek dan Wenstrup (2013), yang menanyakan tentang waktu umum yang dihabiskan anak pada aktivitas kehidupan sehari-hari mereka di luar sekolah selama hari kerja dan akhir pekan, yang terdiri dari: (1) "membaca untuk kesenangan"; (2) "mengerjakan pekerjaan rumah atau belajar"; (3) "menghabiskan waktu bersama teman"; (4) "berolahraga atau aktivitas fisik lainnya"; (5) "menonton televisi"; (6) "bermain *video game* atau permainan komputer"; dan (7) "menggunakan *email*, *Facebook*, atau pesan singkat".

Menurut Straker et al. (2013), "media berbasis layar" adalah istilah yang digunakan untuk menggambarkan aktivitas berbasis layar seperti menggunakan komputer (untuk tugas sekolah, *game*, dan jejaring sosial) dan bermain *game* elektronik. Selanjutnya, "waktu layar" didefinisikan sebagai waktu yang dihabiskan untuk melihat layar atau menggunakan peralatan apa pun dengan layar, termasuk televisi, video digital atau disk serbaguna (*DVD*), permainan video, dan komputer. Saat ini, istilah ini telah diperluas untuk mencakup perangkat genggam atau perangkat visual lainnya. Dalam studi ini, penulis menyesuaikan survei sebelumnya oleh Mazurek dan Wenstrup (2013), hanya dengan berfokus pada aktivitas media berbasis layar selama hari kerja dan akhir pekan seperti: (1) menonton televisi, video, dan film; (2) bermain *video game*; (3) terlibat dalam media sosial; (4) penjelajahan Internet; dan (5) mengerjakan pekerjaan rumah. Penulis juga menginformasikan kepada orang tua bahwa jenis media yang digunakan tidak terbatas pada teknologi berbasis layar, tetapi juga termasuk perangkat genggam, misalnya *smartphone* dan tablet, yang mungkin ditangani oleh anak.

Orang tua harus memberikan tanggapan mereka sesuai dengan skala enam poin yang melaporkan durasi waktu layar harian anak mereka, mulai dari: "0 (*Tidak Sama Sekali*)"; "1 (*Kurang dari 0,5 Jam*)"; "2 (*Lebih dari 0,5-1 Jam*)"; "3 (*Lebih dari 1-2,5 Jam*)"; "4 (*Lebih dari 2,5-4 Jam*)"; dan "5 (*Lebih dari 4 Jam*)". Konsisten dengan

methods utilized by Orsmond and Kuo (2011) and Mazurek and Wenstrup (2013), an average daily use variable was created for each activity by multiplying the weekday score by five, multiplying the weekend score by two, adding both values, and then dividing the sum by seven. Thus, the result of the average time is not merely an average of the weekday and weekend hours, but is weighted to reflect more weekdays than weekend days in a week. The scores obtained correspond to the amount of screen-time. When parents are unsure of how to answer a survey question, the authors suggest that they ask their children, in order to obtain a valid answer instead of guessing.

Empathizing-Systemizing Quotient for Children (EQ-SQ-C)

The Empathizing-Systemizing Quotient for Children (EQ-SQ-C) is a questionnaire with 55 items consisting of two subscales: (1) Empathy Quotient for Children (EQ-C); and (2) Systemizing Quotient for Children (SQ-C). The scales were developed to detect trends in gender-typical behavior of children 4-11 years old. The Empathy Quotient for Children (EQ-C) and Systemizing Quotient for Children (SQ-C) consist of a list of statements about real-life situations, experiences, and interests in which empathizing or systemizing skills are required. In order to look at the extreme ends of the spectrum, several items ask about relatively rare behavior (such as bullying or reactions to the death of a movie character). The questionnaire has four alternatives for each question. The parent indicates how strongly they agree with each statement about their child by choosing one of these alternatives, ranging from: "Definitely Agree"; "Slightly Agree"; "Slightly Disagree"; or "Definitely Disagree" (Auyeung et al., 2009).

The Empathy Quotient for Children (EQ-C) subscale consists of 27 statements. Higher scores on the questionnaire corresponded with more "empathetic" behavior, thus a minimum score of 0 suggests no empathetic behavior and a maximum score of 54 signifies all the support for empathetic behavior. On the other hand, the Systemizing Quotient for Children (SQ-C) subscale consists of 28 statements. The maximum attainable score for this domain is 56, which reflects high systemizing behavior, while the minimum score of 0 suggests that no systemizing behavior is present. Auyeung et al. (2009) indicated that the internal

metode yang digunakan oleh Orsmond dan Kuo (2011) dan Mazurek dan Wenstrup (2013) sebelumnya, rerata penggunaan harian dibuat untuk setiap aktivitas dengan mengalikan skor hari kerja dengan lima, mengalikan skor akhir pekan dengan dua, menambahkan kedua nilai, dan kemudian membagi jumlah tersebut dengan tujuh. Dengan demikian, hasil rerata waktu tidak hanya rerata jam hari kerja dan akhir pekan, tetapi dibobotkan untuk mencerminkan lebih banyak hari kerja daripada hari akhir pekan dalam seminggu. Skor yang diperoleh sesuai dengan jumlah waktu layar. Ketika orang tua tidak yakin bagaimana menjawab pertanyaan survei, penulis menyarankan agar mereka bertanya kepada anak mereka, untuk mendapatkan jawaban yang valid daripada harus menduga-duga.

Empathizing-Systemizing Quotient for Children (EQ-SQ-C)

Empathizing-Systemizing Quotient for Children (EQ-SQ-C) adalah kuesioner dengan 55 butir yang terdiri dari dua subskala: (1) *Empathy Quotient for Children (EQ-C)*; dan (2) *Systemizing Quotient for Children (SQ-C)*. Skala tersebut dikembangkan untuk mendeteksi tren perilaku tipikal *gender* pada anak usia 4-11 tahun. *Empathy Quotient for Children (EQ-C)* dan *Systemizing Quotient for Children (SQ-C)* terdiri dari sejumlah pernyataan mengenai situasi kehidupan nyata, pengalaman, dan minat yang memerlukan keterampilan berempati atau menyusun sistem. Untuk melihat ujung spektrum, beberapa butir menanyakan tentang perilaku yang relatif jarang muncul (seperti intimidasi atau reaksi terhadap kematian karakter film). Kuesioner memiliki empat jawaban untuk setiap pertanyaan. Orang tua menunjukkan seberapa kuat mereka setuju dengan setiap pernyataan tentang anak mereka dengan memilih salah satu dari alternatif berikut, mulai dari: "Sangat Setuju"; "Agak Setuju"; "Sedikit Tidak Setuju"; atau "Sangat Tidak Setuju" (Auyeung et al., 2009).

Subskala *Empathy Quotient for Children (EQ-C)* terdiri dari 27 pernyataan. Skor yang lebih tinggi pada kuesioner berhubungan dengan lebih banyak perilaku "empati", sehingga skor minimum 0 menunjukkan tidak ada perilaku empati dan skor maksimum 54 menandakan semua dukungan untuk perilaku empati. Sedangkan subskala *Systemizing Quotient for Children (SQ-C)* terdiri dari 28 pernyataan. Skor maksimum yang dapat dicapai untuk domain ini adalah 56, yang mencerminkan perilaku sistemisasi yang tinggi, sedangkan skor minimum 0 menunjukkan bahwa tidak ada perilaku sistemisasi. Auyeung et al. (2009) menunjukkan bahwa konsistensi

consistency of the scales was good. Cronbach's alpha coefficients showed a high coefficient for empathy items (α = .93) as well as for systemizing items (α = .73). Moreover, they also indicated a good test-retest reliability for both Empathy Quotient for Children (EQ-C; r = .86; p < .001) and Systemizing Quotient for Children (SQ-C; r = .84; p < .001).

In addition to this survey, a Bahasa Indonesia translation of Empathy Quotient for Children (EQ-C) and Systemizing Quotient for Children (SQ-C) was administered. Cronbach's alpha coefficients were calculated and reflected high coefficients for empathy items (α = 0.84) and acceptable coefficients for systemizing items (α = 0.69). A scale with a Cronbach's alpha value of more than .6 is considered reliable, indicating that the items on the scale can measure constructs consistently (Natalya, 2018).

Autism Spectrum Quotient: Children's Version (AQ-Child)

The Autism Spectrum Quotient: Children's Version (AQ-Child) scale is a parent-report questionnaire that quantifies autistic traits in children 4-11 years old (Auyeung et al., 2008). The Autism Spectrum Quotient: Children's Version (AQ-Child) consists of 50 items and builds based on five different categories of autistic traits. The Autism Spectrum Quotient: Children's Version (AQ-Child) utilizes Likert scales with the four alternatives, ranging from: "Definitely Agree; "Slightly Agree"; "Slightly Disagree"; and "Definitely Disagree".

A higher score will correspond to more autistic traits, with 0 as the lowest total score and 150 as the highest total score. The Autism Spectrum Quotient: Children's Version (AQ-Child) has a high score of total reliability (α = .97). In addition to this survey, a Bahasa Indonesia translation of the Autism Spectrum Quotient: Children's Version (AQ-Child) was administered. Cronbach's alpha coefficients were calculated and reflected that autistic traits items are acceptable (α = 0.76). Based on Natalya's (2018) reference to internal consistency, it is believed that the Autism Spectrum Quotient: Children's Version (AQ-Child) can consistently measure autistic traits in children, as the results of the item consistency test indicate a Cronbach's alpha value exceeding .6.

Procedure

Ethical approval of this study was granted by the Ethical Review Committee of Faculty Psychology and

internal timbangan baik. Koefisien *Cronbach's alpha* menunjukkan koefisien tinggi untuk butir empati (α = 0,93) serta untuk butir sistemisasi (α = 0,73). Selain itu, mereka juga menunjukkan reliabilitas *test-retest* yang baik untuk *Empathy Quotient for Children* (*EQ-C*; r = 0,86; p < 0,001) dan *Systemizing Quotient for Children* (*SQ-C*; r = 0,84; p < 0,001).

Selain survei ini, terjemahan Bahasa Indonesia dari *Empathy Quotient for Children (EQ-C)* dan *Systemizing Quotient for Children (SQ-C)* juga diberikan kepada partisipan. Koefisien *Cronbach's alpha* dihitung dan hasil menunjukkan koefisien tinggi untuk butir empati (α = 0,84) dan koefisien yang dapat diterima untuk butir sistemisasi (α = 0,69). Skala dengan nilai *Cronbach's alpha* lebih dari 0,6 dianggap reliabel, menandakan bahwa butir pada skala tersebut dapat mengukur konstruk secara konsisten (Natalya, 2018).

Autism Spectrum Quotient: Children's Version (AQ-Child)

The *Autism Spectrum Quotient: Children's Version (AQ-Child)* adalah kuesioner berupa laporan orang tua yang mengukur sifat autistik pada anak usia 4-11 tahun (Auyeung et al., 2008). The *Autism Spectrum Quotient: Children's Version (AQ-Child)* terdiri dari 50 butir dan disusun berdasarkan lima kategori sifat autistik yang berbeda. The *Autism Spectrum Quotient: Children's Version (AQ-Child)* menggunakan skala Likert dengan empat alternatif, mulai dari: "Sangat Setuju; "Agak setuju"; "Sedikit Tidak Setuju"; dan "Sangat Tidak Setuju".

Skor yang lebih tinggi akan sesuai dengan lebih banyak sifat autistik, dengan 0 sebagai skor total terendah dan 150 sebagai skor total tertinggi. *Autism Spectrum Quotient: Children's Version (AQ-Child)* memiliki skor reliabilitas total yang tinggi (α = 0,97). Selain survei ini, terjemahan Bahasa Indonesia dari *Autism Spectrum Quotient: Children's Version (AQ-Child)* juga diberikan. Koefisien *Cronbach's alpha* dihitung dan mencerminkan bahwa butir sifat autistik dapat diterima (α = 0,76). Berdasarkan referensi konsistensi internal Natalya (2018), diyakini bahwa *Autism Spectrum Quotient: Children's Version (AQ-Child)* secara konsisten dapat mengukur sifat autis pada anak, karena hasil tes konsistensi butir menunjukkan nilai *Cronbach's alpha* melebihi 0,6.

Prosedur

Persetujuan etis untuk studi ini diberikan oleh *Ethical Review Committee of Faculty Psychology and*

Neuroscience (ERCPN) of Maastricht University (reference ERCPN 176_07_02_2017). All questionnaires entered into the Qualtrics research platform were based on the original validated versions. The questionnaires were distributed to parents as an online link. Upon clicking the survey link, parents were asked to answer the entire questionnaire. The description of the study, the requirements for participation, and instructions for completing the questionnaire were listed on the first page of the survey, along with the informed consent form page. Parents were able to participate only after they stated their approval on the informed consent section at the beginning of the session. Moreover, parents had to consider the preliminary requirements before gaining access to the survey, which were having a child 4-6 years old or 10-12 years old who: (1) was never diagnosed with any disorder; and (2) actively operate screen-based media equipment.

After finishing the survey, participants were thanked and debriefed. To find parents as potential participants for this study, schools were chosen as recruitment centers to control the deployment of the online questionnaire and to ensure that the scale was deliberately completed by the parents. Ten private schools in major cities of Indonesia were contacted by email or telephone to ask whether they were willing to participate in this study. Eventually, seven primary schools in Indonesia agreed to participate in this study. For the next step, all children at the kindergarten level (4-5 years old), the Grade 1 level (six years old), and Grade 5 and Grade 6 level (10-12 years old) received an information letter about the study for their parents to read. The next day, the school distributed the online questionnaire to the designated parents who agreed to join the study. Parents who agreed to be participants required to click the "Agree" button in the informed consent form section to indicate their willingness to participate before being transferred to the full questionnaire.

Data Analysis

Data were analyzed using the International Business Machines (IBM) Statistical Product and Service Solutions (SPSS) version 22.0. Descriptive statistics, including percentage, mean, standard deviation, and range, were conducted to characterize the sample. Regression analyses were computed to examine bivariate relationships and evaluate the contribution of the independent variable (time on screen-based media

Neuroscience (ERCPN) of Maastricht University (referensi ERCPN 176_07_02_2017). Seluruh kuesioner yang dimasukkan ke dalam platform penelitian *Qualtrics* didasarkan pada versi asli yang telah divalidasi. Kuesioner dibagikan kepada orang tua dalam bentuk tautan daring. Setelah mengklik tautan survei, orang tua diminta untuk menjawab seluruh kuesioner. Deskripsi studi, persyaratan untuk berpartisipasi, dan instruksi untuk mengisi kuesioner tercantum di halaman pertama survei, bersama dengan halaman formulir persetujuan (*informed consent*). Orang tua dapat berpartisipasi hanya setelah mereka menyatakan persetujuan mereka pada bagian *informed consent* di awal sesi. Selain itu, orang tua harus mempertimbangkan persyaratan awal sebelum mendapatkan akses ke survei, yaitu memiliki anak berusia 4-6 tahun atau 10-12 tahun yang: (1) tidak pernah didiagnosis gangguan apa pun; dan (2) secara aktif menggunakan perangkat media berbasis layar.

Setelah menyelesaikan survei, peserta diberi ucapan terima kasih dan diberikan *briefing* ulang. Untuk menemukan orang tua sebagai partisipan potensial studi ini, sekolah dipilih sebagai pusat rekrutmen untuk mengontrol penyebaran kuesioner daring dan untuk memastikan bahwa skala tersebut diisi oleh orang tua. Sepuluh sekolah swasta di kota besar di Indonesia dihubungi melalui *email* atau telepon untuk ditanya apakah bersedia berpartisipasi dalam studi ini. Pada akhirnya, tujuh sekolah dasar (SD) di Indonesia setuju untuk berpartisipasi dalam studi ini. Untuk tahap selanjutnya, semua anak di tingkat taman kanak-kanak (TK; usia 4-5 tahun), Kelas 1 (usia enam tahun), dan Kelas 5 dan Kelas 6 (usia 10-12 tahun) menerima surat keterangan tentang studi untuk dibaca orang tuanya. Keesokan harinya, sekolah membagikan kuesioner daring kepada orang tua yang ditunjuk, yang setuju untuk mengikuti studi. Orang tua yang setuju untuk menjadi peserta diminta untuk mengklik tombol "Setuju" di bagian formulir persetujuan untuk memberikan kesediaan mereka untuk berpartisipasi sebelum dipindahkan ke kuesioner lengkap.

Analisis Data

Data dianalisa menggunakan *International Business Machines (IBM) Statistical Product and Service Solutions (SPSS)* versi 22.0. Statistik deskriptif, termasuk persentase, rerata, standar deviasi, dan rentang dilakukan untuk mengkarakterisasi sampel. Analisis regresi dilakukan untuk memeriksa hubungan bivariat dan mengevaluasi kontribusi variabel independen (waktu penggunaan media berbasis layar) terhadap variabel

use) to the continuous dependent variables (measured utilizing the Empathy Quotient for Children (EQ-C), Systemizing Quotient for Children (SQ-C), and Autism Spectrum Quotient: Children's Version (AQ-C)).

In regards to finding the relation of media use and the extreme male brain, the D-Score is also calculated to find a specific correlation pattern. The D-Score measured as a comparison of individual performance on the Empathy Quotient for Children (EQ-C) and Systemizing Quotient for Children (SQ-C) using standardized scores. The D-Score stands as the basis score for evaluating each child's relative ability to empathize or systemize; it is derived from the average of the subtraction of the standardized Systemizing Quotient (SQ) score by the standardized Empathy Quotient (EQ) score (Auyeung et al., 2009). A positive D-Score corresponds to a male brain, whereas a negative D-Score corresponds to a female brain (Wheelwright, 2006).

Result

Descriptive Findings

Descriptive information about the participants is presented in Table 1. Boys and girls in the younger age group were equally distributed, while the older age group contained more girls than boys. The parents who completed the online questionnaire most frequently held a Diploma or Bachelor's degree (66.7%) and worked mostly as entrepreneur (33.3%). As for their spouses, mostly held Diploma or Bachelor's degree (64.7%) and worked mostly as private sector employees (44.9%).

Initially, the parents reported the number of screen-based electronic devices that their children operated, owned, and took to bed at bedtime. These screen-based electronic devices include televisions, smartphones, tablets, computers with or without the internet, and gaming or console devices. Secondly, a statistical analysis of that information was conducted to provide a general overview of screen-based media use habits among children.

The result of a comparison analysis utilizing an independent sample t-test between the two age groups revealed a significant difference in the number of devices handled by the children ($t(205) = -5.804$; $p = .000$). The older age group reportedly operated approximately

dependen berkelanjutan (diukur dengan *Empathy Quotient for Children (EQ-C)*, *Systemizing Quotient for Children (SQ-C)*, dan *Autism Spectrum Quotient: Children's Version (AQ-C)*).

Dalam menemukan hubungan penggunaan media dan otak laki-laki ekstrim, *D-Score* juga dihitung untuk menemukan pola korelasi tertentu. *D-Score* diukur sebagai perbandingan kinerja individu pada *Empathy Quotient for Children (EQ-C)* dan *Systemizing Quotient for Children (SQ-C)* menggunakan skor standar. *D-Score* berdiri sebagai skor dasar untuk mengevaluasi kemampuan relatif setiap anak untuk berempati atau menyusun sistem; berasal dari rerata pengurangan skor *Systemizing Quotient (SQ)* standar dengan skor *Empathy Quotient (EQ)* standar (Auyeung et al., 2009). *D-Score* positif berkorespondensi dengan otak laki-laki, sedangkan *D-Score* negatif berkorespondensi dengan otak perempuan (Wheelwright, 2006).

Hasil

Temuan Deskriptif

Informasi deskriptif partisipan dapat dilihat pada Tabel 1. Anak laki-laki dan perempuan dalam kelompok usia yang lebih muda terdistribusi secara merata, sedangkan kelompok usia yang lebih tua berisi lebih banyak perempuan daripada laki-laki. Sebagian besar orang tua yang mengisi kuesioner daring memiliki gelar Diploma atau Sarjana (66,7%) dan sebagian besar bekerja sebagai wiraswasta (33,3%). Sedangkan untuk pasangannya, sebagian besar berpendidikan Diploma atau Sarjana (64,7%) dan sebagian besar bekerja sebagai pegawai swasta (44,9%).

Awalnya, orang tua melaporkan jumlah perangkat elektronik berbasis layar yang digunakan, dimiliki, dan dibawa anak mereka ke tempat tidur pada waktu tidur. Perangkat elektronik berbasis layar ini meliputi televisi, *smartphone*, tablet, komputer dengan atau tanpa Internet, dan perangkat *game* atau konsol. Kedua, analisis statistik terhadap informasi tersebut dilakukan untuk memberikan gambaran umum tentang kebiasaan penggunaan media berbasis layar di kalangan anak.

Hasil analisis perbandingan menggunakan *independent sample t-test* antara kedua kelompok umur menunjukkan perbedaan yang signifikan dalam jumlah perangkat yang dipegang oleh anak ($t(205) = -5{,}804$; $p = 0{,}000$). Kelompok usia yang lebih tua dilaporkan mengoperasikan

Table 1
General Descriptive Statistics of the Study Participants

Demographic Characteristic	Percentage *n* (%)	
Child Characteristic	Younger Age Group	Older Age Group
Boys	53 (47.7%)	33 (34.4%)
Girls	58 (52.3%)	63 (65.6%)
Age *M* (*SD*)	4.82 (0.81%)	11.01 (0.83%)
Occupational Background	Participants	Spouse
Public Sector Employee	27 (13%)	30 (14.5%)
Private Sector Employee	58 (28%)	93 (44.9%)
Entrepreneur	69 (33.3%)	63 (30.4%)
Student	7 (3.4%)	2 (1%)
Unemployed	46 (22%)	19 (9.2%)
Educational Background *n* (%)	Participants	Spouse
Senior High School	39 (18.8%)	48 (23.2%)
Diploma/Bachelor's Degree	138 (66.7%)	134 (64.7%)
Master's/Doctorate Degree	30 (14.5%)	2 (1%)

Tabel 1
Statistik Deskriptif Umum Partisipan Studi

Karakteristik Demografis	Persentase *n* (%)	
Karakteristik Anak	Kelompok Lebih Muda	Kelompok Lebih Tua
Laki-Laki	53 (47,7%)	33 (34,4%)
Perempuan	58 (52,3%)	63 (65,6%)
Umur *M* (*SD*)	4,82 (0,81%)	11,01 (0,83%)
Latar Belakang Pekerjaan	Partisipan	Pasangan
Karyawan Sektor Publik	27 (13%)	30 (14,5%)
Karyawan Sektor Swasta	58 (28%)	93 (44,9%)
Wirausaha	69 (33,3%)	63 (30,4%)
Pelajar	7 (3,4%)	2 (1%)
Tidak Bekerja	46 (22%)	19 (9,2%)
Latar Belakang Pendirikan *n* (%)	Partisipan	Pasangan
Sekolah Menengah Atas (SMA)	39 (18,8%)	48 (23,2%)
Diploma/Strata-1	138 (66,7%)	134 (64,7%)
Strata-2/Strata-3	30 (14,5%)	2 (1%)

3-4 devices and the younger children engaged up to three devices. Regarding the number of devices that the children owned, differences were found between the age groups ($t(205) = -6.232$; $p = .000$). Young children were reported to own one device on average, while the older children owned two devices on average. The number of devices belonging to the both age groups is the same as the number of devices that accompanies the children when they go to bed, with the older age group accompanied by more devices compared to the younger age group ($t(174.4) = -2.903$; $p = .0004$). Figure 1 portrays data regarding screen-based media device ownership.

The differences of time on screen-based media use between weekdays and weekend days were also examined.

sekitar 3-4 perangkat dan anak yang lebih muda menggunakan hingga tiga perangkat. Mengenai jumlah perangkat yang dimiliki anak, ditemukan perbedaan antara kelompok umur ($t(205) = -6{,}232$; $p = 0{,}000$). Anak lebih muda dilaporkan secara rerata memiliki satu perangkat, sedangkan anak yang lebih tua secara rerata memiliki dua perangkat. Jumlah perangkat yang dimiliki kedua kelompok umur tersebut sama dengan jumlah perangkat yang menemani anak saat tidur, dengan kelompok umur yang lebih tua ditemani lebih banyak perangkat dibandingkan dengan kelompok umur yang lebih muda ($t(174{,}4) = -2{,}903$; $p = 0{,}0004$). Gambar 1 menggambarkan data tentang kepemilikan perangkat media berbasis layar.

Perbedaan waktu penggunaan media berbasis layar antara hari kerja dan akhir pekan juga ditinjau. Anak pada

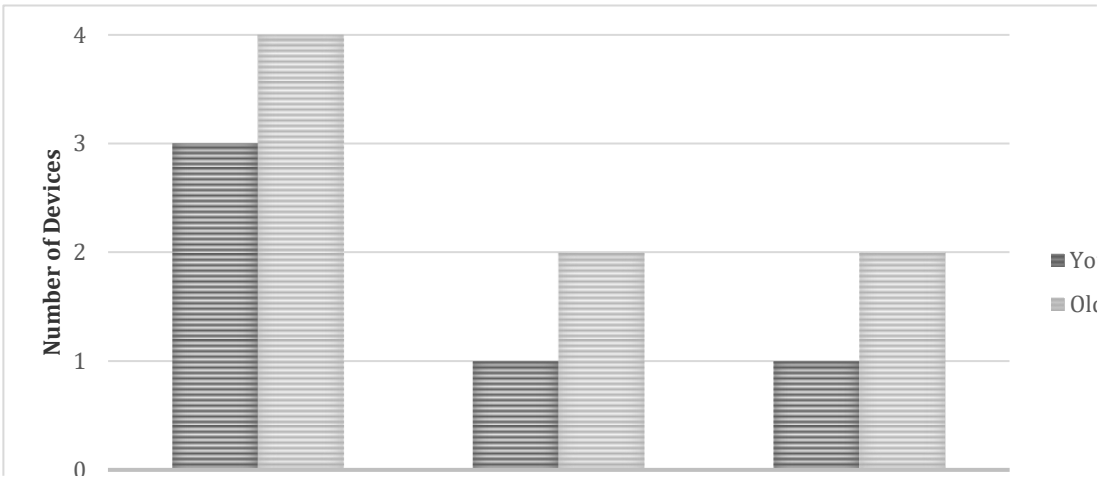
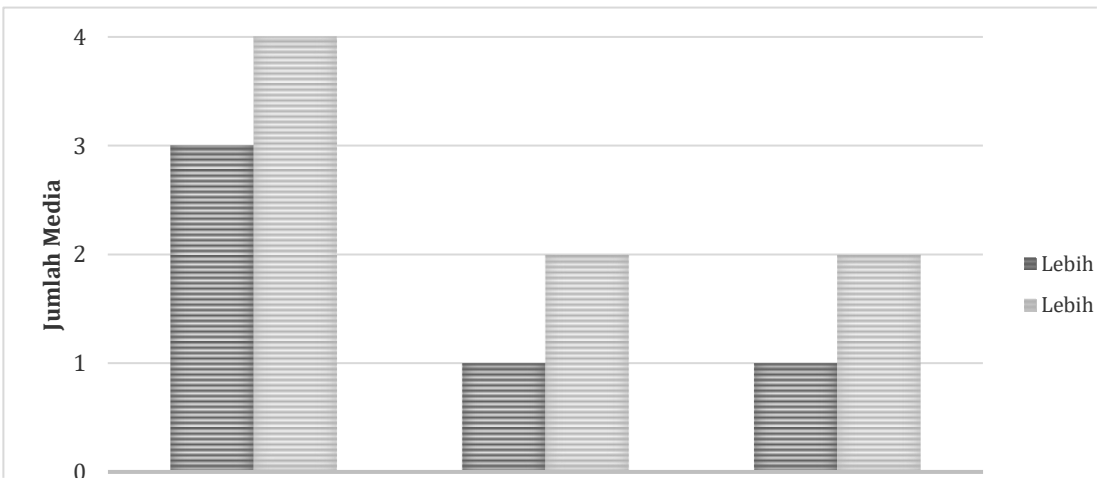


Figure 1. The average number of screen-based media devices owned by Indonesian children.

Children in general were reported to spend a large amount of time on screen-based media use. Parents estimated that their children spent an average of 30-60 minutes per weekday (*SD* = .67) and more than four hours per weekend day (*SD* = 1.94). In total, children were reported to spend, on average, more than four hours per day engaged in screen-based media use. The screen activity which children from all age groups engaged in most was watching television and video, for an average of 1-2.5 hours per day, followed by playing video games, for an average of 30-60 minutes per day. Doing homework was stated as the third most common screen-based activity among children, whereas a lesser amount of time on screen-based media use was for engaging in social media and Internet browsing (see Table 2).

umumnya dilaporkan menghabiskan banyak waktu untuk menggunakan media berbasis layar. Orang tua memperkirakan bahwa anak mereka menghabiskan secara rerata 30-60 menit per hari kerja (*SD* = 0,67) dan lebih dari empat jam per hari akhir pekan (*SD* = 1,94). Secara total, anak dilaporkan menghabiskan, rerata, lebih dari empat jam per hari dalam penggunaan media berbasis layar. Aktivitas layar yang paling banyak dilakukan anak dari semua kelompok umur adalah menonton televisi dan video, dengan rerata 1-2,5 jam per hari, diikuti dengan bermain *video game*, dengan rerata 30-60 menit per hari. Mengerjakan pekerjaan rumah dinyatakan sebagai aktivitas berbasis layar peringkat ketiga paling umum di antara anak, sedangkan jumlah waktu yang lebih sedikit dalam penggunaan media berbasis layar adalah untuk penggunaan media sosial dan menjelajahi Internet (lihat Tabel 2).



Gambar 1. Rerata jumlah media berbasis layar yang dimiliki anak Indonesia.

Table 2
Screen-Based Media Use in Children

Activities	*x*	*SD*	Screen-Time
Watching TV and Video	2.72	1.015	1 - 2.5 hours
Gaming	1.69	1.025	30 - 60 minutes
Doing Homework	1.62	1.17	30 - 60 minutes
Social Media	0.59	0.72	< 30 minutes
Surfing on the Internet	0.59	0.67	< 30 minutes
The Average Duration on Weekdays	1.53	0.67	30 - 60 minutes
The Average Duration on Weekends	4.21	1.94	> 4 hours
The Daily Average Duration	7.88	3.45	> 4 hours

Tabel 2
Penggunaan Media Berbasis Layar Pada Anak

Aktivitas	*x*	*SD*	Waktu Layar
Menonton TV dan Video	2,72	1,015	1 - 2.5 jam
Bermain *Game*	1,69	1,025	30 - 60 menit
Pekerjaan Rumah	1,62	1,17	30 - 60 menit
Media Sosial	0,59	0,72	< 30 menit
Menelusuri Internet	0,59	0,67	< 30 menit
Rerata Durasi di Hari Kerja	1,53	0,67	30 - 60 menit
Rerata Durasi di Akhir Minggu	4,21	1,94	> 4 jam
Rerata Durasi Per Hari	7,88	3,45	> 4 jam

The independent samples t-test was conducted to determine whether a difference exists between the means of the age groups on each screen-based activity. As shown in Table 4, children in the older age group (aged 10-12 years) spent a significant amount of time on screen-based media use as compared to the younger group, with a statistically significant difference (M = 4.3; 95% CI [- 5.07, - 3.57]; $t(205)$ = - 11.3; p = .000). Parents of children in the older age group estimated that their children spent an average of one hour per weekday (M = 1.96; SD = .612) and more than four hours per weekend day (M = 5.59; SD = 1.57) in screen-based activity. In contrast, children in the younger group were reported to spend considerably less time using screen-based activities. Overall, the children in the older age group engaged in screen-based media more than four hours per day (M = 10.19; SD = 2.93) on average.

Additional significant differences between younger and older children groups were found for gaming ($t(205)$ = - 2.512; p = .014), engaging in social media ($t(174.05)$ = - 10.8; p = .000), Internet browsing ($t(180.67)$ = - 11.8; p = .000), and doing homework ($t(204.57)$ = - 11.9; p = .000). The results for those activities showed higher scores for the older group as compared to the younger group. However, the difference between age groups was not significant for watching television and video ($t(205)$

Uji t sampel independen dilakukan untuk menentukan apakah ada perbedaan antara rerata kelompok usia pada setiap aktivitas berbasis layar. Seperti yang ditunjukkan pada Tabel 4, anak dalam kelompok usia yang lebih tua (usia 10-12 tahun) menghabiskan banyak waktu untuk menggunakan media berbasis layar dibandingkan dengan kelompok yang lebih muda, dengan perbedaan yang signifikan secara statistik (M = 4,3; 95% CI [- 5,07, - 3,57]; $t(205)$ = - 11,3; p = 0,000). Orang tua dari anak dalam kelompok usia yang lebih tua memperkirakan bahwa anak mereka menghabiskan rerata satu jam per hari kerja (M = 1,96; SD = 0,612) dan lebih dari empat jam per hari akhir pekan (M = 5,59; SD = 1,57) di aktivitas berbasis layar. Sebaliknya, anak dalam kelompok yang lebih muda dilaporkan menghabiskan lebih sedikit waktu menggunakan aktivitas berbasis layar. Secara keseluruhan, anak dalam kelompok usia yang lebih tua menggunakan media berbasis layar dengan rerata lebih dari empat jam per hari (M = 10,19; SD = 2,93).

Perbedaan signifikan lainnya antara kelompok anak yang lebih muda dan lebih tua ditemukan dalam bermain *game* ($t(205)$ = - 2,512; p = 0,014), menggunakan media sosial ($t(174.05)$ = - 10,8; p = 0,000), menjelajahi Internet ($t(180,67)$ = - 11,8; p = 0,000), dan mengerjakan pekerjaan rumah ($t(204,57)$ = - 11,9; p = 0,000). Hasil kegiatan tersebut menunjukkan skor yang lebih tinggi untuk kelompok yang lebih tua dibandingkan dengan kelompok yang lebih muda. Namun, perbedaan antara kelompok

= - .013; p = .989). Table 4 provides more complete data regarding average daily time spent on each activity by age group.

Correlations Between Media Use and Empathizing, Systemizing, and Autistic Traits

Regarding the potential association between media use and the dependent variables and determining the influence of the duration of screen-based media use on the dependent variable measured, a linear regression analysis was performed. In addition, the analysis also determined the strength and direction of a linear relationship between the variables.

As Table 3 shows, there was indeed a positive correlation between the total duration of screen-based media use and systemizing (β = .215; p < .05) and the D-Score (β = .167; p < .05). The total time spent by children on screen-based media use was a significant predictor for systemizing and D-Score, explaining only 4.2% of the variance in systemizing (*Adjusted* R^2 = .042; *F(1, 205)* = 9.978; p < .05], whereas it explained 2.3% of the variance in the D-Score (*Adjusted* R^2 = .023; *F(1, 205)* = 5.904; p < .05]. However, the association between the total duration of screen-based media use did not reach statistical significance with empathizing (β = .017; p > .05) and autistic traits (β = .078; p > .05).

Furthermore, the correlation analysis was also conducted for the time on each screen-based media use activity toward the Empathy Quotient (EQ), Systemizing Quotient (SQ), D-Score, and Autism Spectrum Quotient (AQ). A distinct relationship was found for each type of screen-based activity and the dependent variables. Empathizing was negatively correlated with time spent on watching activities (β = - .137; p < .05) and gaming (β = - .156; p < .05). A linear regression analysis found that the duration of time spent watching television-videos and gaming is a significant predictor for empathizing, explaining the variability at 1.4% (*Adjusted* R^2 = .014; *F(1, 205)* = 3.926; p < .05) and 2% (*Adjusted* R^2 = .020; *F(1, 205)* = 5.108; p < .05), respectively. Meanwhile, systemizing was positively correlated with time spent on Internet browsing (β = .208; p < .05) and doing homework (β = .291; p < .000). In regards to systemizing, time spent on Internet browsing explained 3.9% of the variability (*Adjusted* R^2 = .039; *F(1, 205)* = 9.268; p < .05) and time spent doing homework explained 8% of the variability (*Adjusted* R^2 = .080; *F(1, 205)* = 18.89; p < .05).

umur tidak signifikan untuk menonton televisi dan video (*t(205)* = - 0,013; p = 0,989). Tabel 4 memberikan data yang lebih lengkap mengenai rerata waktu harian yang dihabiskan untuk setiap kegiatan menurut kelompok umur.

Korelasi Antara Penggunaan Media dan Empati, Sistemisasi, dan Sifat Autistik

Mengenai hubungan potensial antara penggunaan media dan variabel dependen dan menentukan pengaruh durasi penggunaan media berbasis layar pada variabel dependen yang diukur, analisis regresi linier dilakukan. Selain itu, analisis juga menentukan kekuatan dan arah hubungan linier antar variabel.

Seperti yang ditunjukkan Tabel 3, terlihat adanya korelasi positif antara total durasi penggunaan media berbasis layar dan sistemisasi (β = 0,215; p < 0,05) dan *D-Score* (β = 0,167; p < 0,05). Total waktu yang dihabiskan oleh anak pada penggunaan media berbasis layar adalah prediktor yang signifikan untuk sistemisasi dan *D-Score*, menjelaskan hanya 4,2% varian dalam sistemisasi (*Adjusted* R^2 = 0,042; *F(1, 205)* = 9,978; p < 0,05], sedangkan itu menjelaskan 2,3% dari varians dalam *D-Score* (*Adjusted* R^2 = .023; *F(1, 205*) = 5,904; p < 0,05]. Namun, hubungan antara total durasi penggunaan media berbasis layar tidak mencapai signifikansi statistik dengan empati (β = 0,017; p > 0,05) dan sifat autistik (β = 0,078; p > 0,05).

Selain itu, juga dilakukan analisis korelasi waktu pada setiap aktivitas penggunaan media berbasis layar terhadap *Empathy Quotient (EQ), Systemizing Quotient (SQ), D-Score,* dan *Autism Spectrum Quotient (AQ).* Hubungan yang berbeda ditemukan untuk tiap jenis aktivitas berbasis layar dan variabel dependen. Empati berkorelasi negatif dengan waktu yang dihabiskan untuk menonton aktivitas (β = - 0,137; p < 0,05) dan bermain *game* (β = - 0,156; p < 0,05). Analisis regresi linier menemukan bahwa durasi waktu yang dihabiskan untuk menonton video di televisi dan bermain *game* merupakan prediktor yang signifikan untuk berempati, menjelaskan variabilitas sebesar 1,4% (*Adjusted* R^2 = 0,014; *F(1, 205*) = 3,926; p < 0,05) dan 2% (*Adjusted* R^2 = 0,020; *F(1, 205)* = 5,108; p < 0,05), berturut-turut. Sementara itu, sistemisasi berkorelasi positif dengan waktu yang dihabiskan untuk menelusuri Internet (β = 0,208; p < 0,05) dan mengerjakan pekerjaan rumah (β = 0,291; p < 0,000). Sehubungan dengan sistemisasi, waktu yang dihabiskan untuk menjelajahi Internet menjelaskan 3,9% dari variabilitas (*Adjusted* R^2 = 0,039; *F(1, 205)* = 9,268; p < 0,05) dan waktu yang dihabiskan untuk mengerjakan pekerjaan rumah menjelaskan 8% dari variabilitas (*Adjusted* R^2= 0,080; *F(1, 205*) = 18,89; p < 0,05).

Table 3
Linear Regression Analysis Predicting Empathizing, Systemizing, and Autistic Traits

	B	*SE B*	*β*	*t*	*Sig.*	R^2	*Adjusted* R^2
Empathizing							
Watching	- 0.957	0.483	- .137*	- 1.981	.049*	.019	.014
Gaming	- 1.078	0.477	- .156*	- 2.260	.025*	.024	.020
Social Media	0.298	0.688	.030	0.434	.665	.001	- .004
Internet Browsing	0.842	0.741	.079	1.136	.257	.006	.001
Doing Homework	0.938	0.417	.155*	2.248	.026	.024	.019
Total Media Use	0.035	0.142	.017	0,243	.808	.000	- .005
Systemizing							
Watching	- 0.039	0.403	- .007	- 0.097	.923	.000	- .005
Gaming	0.206	0.399	.036	0.517	.606	.001	- .004
Social Media	1.065	0.564	.131	1.887	.061	.017	.012
Internet Browsing	1.830	0.601	.208*	3.044	.003*	.043	.039
Doing Homework	1.453	0.334	.291**	4.347	.000*	.084	.080
Total Media Use	0.363	0.115	.215*	3.158	.002*	.046	.042
D-Score							
Watching	0.009	0.004	.142*	2.059	.041*	.020	.015
Gaming	0.012	0.004	.200*	2.918	.004*	.040	.035
Social Media	0.007	0.006	.080	1.148	.252	.006	.002
Internet Browsing	0.009	0.006	.94	1.348	.179	.009	.004
Doing Homework	0.004	0.004	.083	1.188	.236	.007	.002
Total Media Use	0.003	0.001	.167*	2.430	.016*	.028	.023
Autism Quotient							
Watching	0.143	0.356	.028	0.402	.688	.001	- .004
Gaming	0.769	0.349	.152*	2.203	.029*	.023	.018
Social Media	0.193	0.503	.027	0.384	.702	.001	- .004
Internet Browsing	0.537	0.542	.069	0.992	.323	.005	.000
Doing Homework	0.420	0.307	.095	1.367	.173	.009	.004
Total Media Use	0.116	0.104	.078	1.118	.265	.006	.001

Notes. $N = 207$; $^{*}p < .05$; $^{**}p < .01$; $^{***}p < .001$.

Regarding the extreme male brain, the study found that D-Scores correlated positively with time spent on watching television-videos activities ($\beta = .142$; $p < .05$) dan gaming ($\beta = .200$; $p < .05$). Time spent on watching television and video explained only 1.5% variability of D-Score, while time devoted to gaming explained 3.5% variability of D-Score (*Adjusted* $R^2 = .035$; *F(1, 205)* = 18.89; $p < .05$]. Bolstering the findings of the D-Score, the Autistic Spectrum Quotient (AQ) also showed a positive correlation with time spent on gaming ($\beta = .152$; $p < .05$), explained 1.8% variability of the Autistic Spectrum Quotient (AQ) (*Adjusted* $R^2 = .018$; *F(1, 205)* = 4.852; $p < .05$].

Mengenai otak laki-laki ekstrim, studi ini menemukan bahwa *D-Score* berkorelasi positif dengan waktu yang dihabiskan untuk menonton aktivitas televisi-video (β = 0,142; $p < 0,05$) dan *game* (β = 0,200; $p < 0,05$). Waktu yang dihabiskan untuk menonton televisi dan video menjelaskan hanya 1,5% variabilitas *D-Score*, sedangkan waktu yang dihabiskan untuk bermain *game* menjelaskan 3,5% variabilitas *D-Score* (*Adjusted* R^2= 0,035; *F(1, 205)* = 18,89; $p < 0,05$]. Memperkuat temuan *D-Score*, *Autistic Spectrum Quotient (AQ)* juga menunjukkan korelasi positif dengan waktu yang dihabiskan untuk bermain *game* (β = 0,152; $p < 0,05$), menjelaskan variabilitas 1,8% dari *Autistic Spectrum Quotient* (*AQ*; *Adjusted* R^2= 0,018; *F(1, 205)* = 4,852; $p < 0,05$].

Discussion

The goal of the current study was to examine the relation between screen-based media use, the Empathy

Diskusi

Tujuan dari studi ini adalah menguji hubungan antara penggunaan media berbasis layar, *Empathy Quotient (EQ)*,

Tabel 3
Analisis Regresi Linear Dalam Prediksi Empathizing, Systemizing, dan Autism Quotient

	B	*SE B*	*β*	*t*	*Sig.*	R^2	*Adjusted* R^2
Empathizing							
Nonton	- 0,957	0,483	- 0,137*	- 1,981	0,049*	0,019	0,014
Main *Game*	- 1,078	0,477	- 0,156*	- 2,260	0,025*	0,024	0,020
Media Sosial	0,298	0,688	0,030	0,434	0,665	0,001	- 0,004
Telusur Internet	0,842	0,741	0,079	1,136	0,257	0,006	0,001
Pekerjaan Rumah	0,938	0,417	0,155*	2,248	0,026	0,024	0,019
Total Waktu Media	0,035	0,142	0,017	0,243	0,808	0,000	- 0,005
Systemizing							
Nonton	- 0,039	0,403	- 0,007	- 0,097	0,923	0,000	- 0,005
Main *Game*	0,206	0,399	0,036	0,517	0,606	0,001	- 0,004
Media Sosial	1,065	0,564	0,131	1,887	0,061	0,017	0,012
Telusur Internet	1,830	0,601	0,208*	3,044	0,003*	0,043	0,039
Pekerjaan Rumah	1,453	0,334	0,291**	4,347	0,000*	0,084	0,080
Total Waktu Media	0,363	0,115	0,215*	3,158	0,002*	0,046	0,042
D-Score							
Nonton	0,009	0,004	0,142*	2,059	0,041*	0,020	0,015
Main *Game*	0,012	0,004	0,200*	2,918	0,004*	0,040	0,035
Media Sosial	0,007	0,006	0,080	1,148	0,252	0,006	0,002
Telusur Internet	0,009	0,006	0,94	1,348	0,179	0,009	0,004
Pekerjaan Rumah	0,004	0,004	0,083	1,188	0,236	0,007	0,002
Total Waktu Media	0,003	0,001	0,167*	2,430	0,016*	0,028	0,023
Autism Quotient							
Nonton	0,143	0,356	0,028	0,402	0,688	0,001	- 0,004
Main *Game*	0,769	0,349	0,152*	2,203	0,029*	0,023	0,018
Media Sosial	0,193	0,503	0,027	0,384	0,702	0,001	- 0,004
Telusur Internet	0,537	0,542	0,069	0,992	0,323	0,005	0,000
Pekerjaan Rumah	0,420	0,307	0,095	1,367	0,173	0,009	0,004
Total Waktu Media	0,116	0,104	0,078	1,118	0,265	0,006	0,001

Catatan. $N = 207$; $^{*}p < 0,05$; $^{**}p < 0,01$; $^{***}p < 0,001$.

Quotient (EQ), Systemizing Quotient (SQ), Autistic Spectrum Quotient (AQ) or autistic traits, and extreme male brain in typically developing Indonesian children. This study found that the total duration of media use was significantly correlated with the Systemizing Quotient (SQ), but not the Empathy Quotient (EQ) in Indonesian children. Another finding was that the total duration of media use had no significant correlation for the Autistic Spectrum Quotient (AQ) score but it was significant for the D-Score. Results also demonstrated a relation between the time spent on specific screen activities. The examples being: (1) the time spent by children on Internet browsing and doing homework correlated significantly with the Systemizing Quotient (SQ); (2) the time spent watching television and video and gaming were associated negatively with the Empathy Quotient (EQ) and extreme male brain; and (3) the gaming duration also positively related with the Autistic Spectrum Quotient (AQ) level. Thus, the relation between media use and the variables measured might also

Systemizing Quotient (SQ), Autistic Spectrum Quotient (AQ) atau sifat autistik, dan otak laki-laki ekstrim pada anak Indonesia yang sedang berkembang. Studi ini menemukan bahwa total durasi penggunaan media berkorelasi signifikan dengan *Systemizing Quotient (SQ)*, tetapi tidak dengan *Empathy Quotient (EQ)* pada anak Indonesia. Temuan lain adalah bahwa total durasi penggunaan media tidak memiliki korelasi yang signifikan terhadap skor *Autistic Spectrum Quotient (AQ)* tetapi signifikan untuk *D-Score*. Hasil juga menunjukkan hubungan antara waktu yang dihabiskan untuk aktivitas layar tertentu. Sebagai contoh adalah: (1) waktu yang dihabiskan oleh anak untuk menjelajahi Internet dan mengerjakan pekerjaan rumah berkorelasi secara signifikan dengan *Systemizing Quotient (SQ)*; (2) waktu yang dihabiskan untuk menonton televisi dan video serta bermain *game* dikaitkan secara negatif dengan *Empathy Quotient (EQ)* dan otak laki-laki ekstrim; dan (3) durasi bermain game juga berhubungan positif dengan tingkat *Autistic Spectrum Quotient (AQ)*. Dengan demikian, hubungan

Table 4
Activity Participation in Children in Younger (4-6 Years) Versus Older (10-12 Years) Age Group

	Independent Sample T-Test (Age Group)			Younger (n = 111)	Older (n = 96)	Younger (n = 111)		Older (n = 96)	
	t	*p*				Boys (n = 53)	Girls (n = 58)	Boys (n = 33)	Girls (n = 63)
Watching TV & Video	- 0.013	.989	*x*	2.72	2.72	2.48	2.93	2.72	2.72
			SD	1.07	0.95	1.08	1.03	0.746	1.05
			Screen-Time	1 - 2.5 h	1 - 2.5 h	30 - 60 m	1 - 2.5 h	1 - 2.5 h	1 - 2.5 h
Gaming	- 2.512	.013*	*x*	1.52	1.88	1.57	1.49	2.27	1.67
			SD	0.96	1.07	1.02	0.91	0.99	1.06
			Screen-Time	30 - 60 m	30 - 60 m	30 - 60 m	< 30 m	30 - 60 m	30 - 60 m
Social Media	- 10.791	.000**	*x*	0.18	1.06	0.18	0.18	0.74	1.22
			SD	0.48	0.65	0.50	0.48	0.67	0.59
			Screen-Time	Never	30 - 60 m	Never	Never	< 30 m	< 30 m
Internet Browsing	- 11.876	.000**	*x*	0.20	1.06	0.25	0.14	0.91	1.12
			SD	0.45	0.57	0.49	0.41	0.61	0.53
			Screen-Time	Never	< 30 m	Never	Never	< 30 m	< 30 m
Doing Homework	- 11.994	.000**	*x*	1.12	2.62	1.14	1.11	2.52	2.67
			SD	0.98	0.81	0.88	1.07	0.73	0.85
			Screen-Time	< 30 m	1 - 2.5 h	< 30 m	< 30 m	1 - 2.5 h	1 - 2.5 h
Total Media Use	- 11.228	.000**	*x*	5.88	10.19	5.78	5.97	9.70	10.45
			SD	2.54	2.93	2.62	2.48	2.42	3.15
			Screen-Time	> 4 h	> 4 h +	> 4 h	> 4 h	> 4 h +	> 4 h +

Notes. N = 207; *p < .05; **p < .01; ***p < .001; h = hours; m = minutes.

be related to the content.

Screen-Based Media Use

Indonesian children in the current sample spent, on average, more than four hours per day on screen-based media use. Even more, the time spent engaging with screen-based media almost has surpassed the screen times of children with Autistic Spectrum Disorder (ASD) globally, which was previously reported at about 4.5 hours per day (Mazurek & Wenstrup, 2013). The finding in Indonesian children replicates the findings from the United States of America's children's study that found no significant differences between screen times of typically developing children and children with

antara penggunaan media dan variabel yang diukur mungkin juga terkait dengan kontennya.

Penggunaan Media Berbasis Layar

Anak Indonesia dalam sampel saat ini menghabiskan rerata lebih dari empat jam per hari untuk penggunaan media berbasis layar. Terlebih lagi, waktu yang dihabiskan untuk berinteraksi dengan media berbasis layar hampir melampaui waktu layar anak dengan *Autistic Spectrum Disorder (ASD)* secara global, yang sebelumnya dilaporkan sekitar 4,5 jam per hari (Mazurek & Wenstrup, 2013). Temuan pada anak Indonesia mereplikasi temuan dari studi anak di Amerika Serikat yang tidak menemukan perbedaan yang signifikan antara waktu layar anak dengan perkembangan umum dan anak

Tabel 4
Partisipasi Aktivitas Anak Dalam Kelompok Lebih Muda (4-6 Tahun) Versus Lebih Tua (10-12 Tahun)

	Independent Sample T-Test (Kelompok Umur)			Lebih Muda (*n* = 111)	Lebih Tua (*n* = 96)	Lebih Muda (*n* = 111)		Lebih Tua (*n* = 96)	
	t	*p*				Laki-Laki (*n* = 53)	Perempuan (*n* = 58)	Laki-Laki (*n* = 33)	Perempuan (*n* = 63)
Nonton TV & Video	- 0,013	0,989	*x*	2,72	2,72	2,48	2,93	2,72	2,72
			SD	1,07	0,95	1,08	1,03	0,746	1,05
			Waktu Layar	1 - 2,5 j	1 - 2,5 j	30 - 60 m	1 - 2,5 j	1 - 2,5 j	1 - 2,5 j
Main *Game*	- 2,512	0,013*	*x*	1,52	1,88	1,57	1,49	2,27	1,67
			SD	0,96	1,07	1,02	0,91	0,99	1,06
			Waktu Layar	30 - 60 m	30 - 60 m	30 - 60 m	< 30 m	30 - 60 m	30 - 60 m
Media Sosial	- 10,791	0,000**	*x*	0,18	1,06	0,18	0,18	0,74	1,22
			SD	0,48	0,65	0,50	0,48	0,67	0,59
			Waktu Layar	Tidak Pernah	30 - 60 m	Tidak Pernah	Tidak Pernah	< 30 m	< 30 m
Menelusuri Internet	- 11,876	0,000**	*x*	0,20	1,06	0,25	0,14	0,91	1,12
			SD	0,45	0,57	0,49	0,41	0,61	0,53
			Waktu Layar	Tidak Pernah	< 30 m	Tidak Pernah	Tidak Pernah	< 30 m	< 30 m
Pekerjaan Rumah	- 11,994	0,000**	*x*	1,12	2,62	1,14	1,11	2,52	2,67
			SD	0,98	0,81	0,88	1,07	0,73	0,85
			Waktu Layar	< 30 m	1 - 2,5 j	< 30 m	< 30 m	1 - 2,5 j	1 - 2,5 j
Total Waktu Media	- 11,228	0,000**	*x*	5,88	10,19	5,78	5,97	9,70	10,45
			SD	2,54	2,93	2,62	2,48	2,42	3,15
			Waktu Layar	> 4 j	> 4 j +	> 4 j	> 4 j	> 4 j +	> 4 j +

Catatan. $N = 207$; $^{*}p < 0,05$; $^{**}p < 0,01$; $^{***}p < 0,001$; j = jam; m = menit.

Autistic Spectrum Disorder (ASD) because both groups had already high screen time use (Montes, 2016).

Not very surprisingly, this study found that media consumption of older children is higher than those young ones. When compared to younger children, older children are reported to spend more on playing video games, using social media, browsing the Internet, and doing homework. These findings bolster another study regarding screen-based media use duration in Indonesia. The study by Amelia and Ramdani (2019) on school-age children found that school-age children spend on average two hours per day on screen-based media which is exceed the duration of screen-based media use among

dengan *Autistic Spectrum Disorder (ASD)* karena kedua kelompok sudah menggunakan waktu layar yang tinggi (Montes, 2016).

Tidak mengherankan bahwa dalam studi ini temuan menunjukkan bahwa konsumsi media anak yang lebih tua lebih tinggi daripada anak yang lebih muda. Jika dibandingkan dengan anak yang lebih muda, anak yang lebih tua dilaporkan menghabiskan lebih banyak uang untuk bermain *video game*, menggunakan media sosial, menjelajahi Internet, dan mengerjakan pekerjaan rumah. Temuan ini mendukung studi lain mengenai durasi penggunaan media berbasis layar di Indonesia. Studi Amelia dan Ramdani (2019) pada anak usia sekolah menemukan bahwa anak usia sekolah menghabiskan rerata

pre-school children which has been reported to be one hour per day according to Susilowati et al. (2021). The high screen time on these screen activities is also supported by the fact that older children own an average of 3-4 screen-based devices, while younger children own an average of only up to 3 devices. Currently, Nielsen's (2005) survey on children's media use already reported that the incidence of online activity among children is linearly increased with age from two to 17. Furthermore, children become more independent users of social media by actively opening their account in social media or gaming platforms at eight years old (Nielsen, 2005).

The data provided seems to suggest that children in the older age group have more accessibility to screen devices and spend more time with it. Along similar lines, longitudinal research about predicting children's media use in the United States of America suggested that children's media habits are reinforced over time. Age is positively associated with time spent on media (television and computer), particularly for children aged 0-4 years and 9-12 years; hence suggesting the media consumption will get higher as children grow older (Lee et al., 2009).

Screen-Based Media Use and Systemizing Quotient (SQ)

According to the current study, the duration of Indonesian children's screen-based media use correlates positively with the Systemizing Quotient (SQ). As the duration of screen-based media use increases or decreases, the Systemizing Quotient (SQ) level will increase or decrease with it. This result confirms the hypothesis that the use of media positively correlates with children's ability to systemize, which defined as the ability to follow and identify the rules that govern the system and to predict how that system will behave (Baron-Cohen, 2006).

Another finding from this study is that a positive correlation exists between the Systemizing Quotient (SQ) and both browsing on the Internet and doing homework. The relation between these screens' activities and the Systemizing Quotient (SQ) showed a moderate strength, meaning that browsing the Internet and doing homework moderately relate to the systemizing level of children. Browsing on the Internet

dua jam per hari pada media berbasis layar yang melebihi durasi penggunaan media berbasis layar pada anak pra sekolah, yang dilaporkan hanya satu jam per hari menurut Susilowati et al. (2021). Tingginya waktu penggunaan pada aktivitas layar ini juga didukung oleh fakta bahwa anak yang lebih tua rerata memiliki 3-4 perangkat berbasis layar, sedangkan anak yang lebih muda rerata hanya memiliki hingga tiga perangkat. Saat ini, survei Nielsen (2005) tentang penggunaan media anak telah melaporkan bahwa aktivitas daring di antara anak meningkat secara linier dengan usia dari dua tahun menjadi 17 tahun. Selanjutnya, anak menjadi pengguna media sosial yang lebih mandiri, dengan aktif membuka akun mereka di media sosial atau platform *game* pada usia delapan tahun (Nielsen, 2005).

Data yang diberikan tampaknya menunjukkan bahwa anak-anak dalam kelompok usia yang lebih tua memiliki lebih banyak akses ke perangkat layar dan menghabiskan lebih banyak waktu dengan perangkat tersebut. Sejalan dengan itu, penelitian longitudinal tentang prediksi penggunaan media anak-anak di Amerika Serikat menunjukkan bahwa kebiasaan media anak-anak diperkuat dari waktu ke waktu. Usia berhubungan positif dengan waktu yang dihabiskan untuk media (televisi dan komputer), terutama untuk anak usia 0-4 tahun dan 9-12 tahun; maka disimpulkan bahwa konsumsi media akan semakin tinggi seiring bertambahnya usia anak (Lee et al., 2009).

Penggunaan Media Berbasis Layar dan Systemizing Quotient (SQ)

Menurut studi ini, durasi penggunaan media berbasis layar anak Indonesia berkorelasi positif dengan *Systemizing Quotient (SQ)*. Saat durasi penggunaan media berbasis layar bertambah atau berkurang, level *Systemizing Quotient (SQ)* akan bertambah atau berkurang bersamanya. Hasil ini mengkonfirmasi hipotesis bahwa penggunaan media berkorelasi positif dengan kemampuan anak untuk sistemasi, yang didefinisikan sebagai kemampuan untuk mengikuti dan mengidentifikasi aturan yang mengatur sistem dan untuk memprediksi bagaimana sistem itu akan berperilaku (Baron-Cohen, 2006).

Temuan lain dari studi ini adalah bahwa ada korelasi positif antara *Systemizing Quotient (SQ)* dan menjelajahi Internet serta mengerjakan pekerjaan rumah. Hubungan antara aktivitas layar ini dan *Systemizing Quotient (SQ)* menunjukkan kekuatan yang sedang, artinya menjelajahi Internet dan mengerjakan pekerjaan rumah cukup berhubungan dengan tingkat sistemisasi anak. Menjelajahi Internet menuntut anak untuk melakukan

requires children to perform systematic searching, whereas doing homework might also include the systematic searching activities and closely related with computer work. According to Baron-Cohen (2002), computers are known as predictive close system because they consist of strict laws and well-defined systems and are controllable in principle.

It is the nature of screen-based media, especially various computer applications and computer games, to be designed in ways that emphasize visual processing. A study of children ages 10 to 11 has also found improvement in their ability to anticipate targets and predict visual spatial paths after playing the "Marble Madness" video game - a game that challenges the player to keep the marble moving on a path by preventing it from falling off the path or being attacked by intruders (Subrahmanyam & Greenfield, 1994). Several investigations involving children have already found that repeated exposure to cinematic codes on a screen lead to higher scores on search tasks which require children to find details on a complex display. In line with this finding, gaming and watching activities also elevate a child's ability to track more items in a group of distractor items, reflecting an increase in filtering ability (Schmidt & Vandewater, 2008). Playing games also reported to induces changes in a number of sensory, perceptual, and attentional abilities which is helped to complete spatial cognition task and mental rotation. The capacities include contrast sensitivity, spatial resolution, the attentional visual field, enumeration, multiple object tracking, and visuomotor coordination and speed (Spence & Feng, 2010). A review also outlined the results of several studies on the effects of home computer use on children's activities and development. Namely, Subrahmanyam et al. (2000) indicated that home computer use can improve children's visual intelligence skills, such as the ability to read and visualize images in three-dimensional space and trace multiple images simultaneously, because the content of screens mostly consists of rapid movements, imagery, and intense interaction.

Another study involving early childhood computer experiences and cognitive and motor development in 122 preschool children found that access to a computer from early on is positively correlated with the subscales of the Wechsler Preschool and Primary Scale of Intelligence - Revised (WPPSI-R). The study found that children who have a computer at home performed

pencarian secara sistematis, sedangkan mengerjakan pekerjaan rumah bisa juga termasuk kegiatan pencarian secara sistematis dan berkaitan erat dengan pekerjaan komputer. Menurut Baron-Cohen (2002), komputer dikenal sebagai *predictive close system* karena terdiri dari hukum yang ketat dan sistem yang terdefinisi dengan baik, dan pada prinsipnya dapat dikontrol.

Sifat dari media berbasis layar, khususnya berbagai aplikasi komputer dan permainan komputer, memang dirancang sedemikian rupa sehingga menekankan pemrosesan visual. Sebuah studi terhadap anak usia 10 hingga 11 tahun juga menemukan peningkatan dalam kemampuan mereka untuk mengantisipasi target dan memprediksi jalur spasial visual setelah memainkan *video game "Marble Madness"* - sebuah *game* yang menantang pemain untuk menjaga kelereng tetap bergerak di jalur dengan cara mencegahnya jatuh dari jalan atau diserang oleh penyusup (Subrahmanyam & Greenfield, 1994). Beberapa investigasi yang melibatkan sampel anak telah menemukan bahwa paparan kode sinematik berulang kali pada layar menghasilkan skor yang lebih tinggi pada tugas pencarian yang mengharuskan anak menemukan detail pada tampilan yang kompleks. Sejalan dengan temuan ini, aktivitas bermain dan menonton juga meningkatkan kemampuan anak untuk melacak lebih banyak poin dalam kelompok poin distraktor, yang mencerminkan peningkatan kemampuan penyaringan (Schmidt & Vandewater, 2008). Bermain *game* juga dilaporkan menginduksi perubahan pada sejumlah kemampuan sensorik, perseptual, dan atensi yang membantu menyelesaikan tugas kognisi spasial dan rotasi mental. Kapasitas ini termasuk sensitivitas kontras, resolusi spasial, bidang visual perhatian, pencacahan, pelacakan beberapa objek, dan koordinasi dan kecepatan visuomotor (Spence & Feng, 2010). Sebuah tinjauan juga menguraikan hasil beberapa studi tentang efek penggunaan komputer di rumah terhadap aktivitas dan perkembangan anak. Subrahmanyam et al. (2000) menunjukkan bahwa penggunaan komputer di rumah dapat meningkatkan keterampilan kecerdasan visual anak, seperti kemampuan membaca dan memvisualisasikan gambar dalam ruang tiga dimensi dan melacak banyak gambar secara bersamaan, karena konten layar sebagian besar terdiri dari gerakan cepat, pencitraan, dan interaksi kuat.

Studi lain yang melibatkan pengalaman penggunaan komputer pada anak usia dini dan perkembangan kognitif dan motorik pada 122 anak prasekolah menemukan bahwa akses ke komputer sejak dini berkorelasi positif dengan subskala *Wechsler Preschool and Primary Scale of Intelligence - Revised (WPPSI-R)*. Studi tersebut menemukan bahwa anak yang memiliki

significantly better on the block design, picture completion, information, and similarities tests on the Wechsler Preschool and Primary Scale of Intelligence - Revised (WPPSI-R). Even more, the children performed much better in picture completion tasks and block design tasks if they used a computer frequently, as compared to children who used a computer much less frequently (monthly or less; Li & Atkins, 2004). Traditionally, the Wechsler Preschool and Primary Scale of Intelligence - Revised (WPPSI-R) performance test measures fluid reasoning, spatial processing, attentiveness to detail, and visual motor integration (Lichtenberger, 2005).

These performance tasks are related to the nature of systemizing. For instance, the block design test, which asks the children to copy designs either from a design made by the experimenter or from a design in a book, requires the ability to record the design before translating it into their own handiwork. Picture completion subtests instruct the children to identify a missing part from an incomplete picture, while the similarities subtest requires children to identify similar pictures and explain the similarities between them. Both tests require the ability to analyze and to detect detail (Wechsler, 1989). Therefore, this study thus provides additional support for a relationship between media use and systemizing behavior which found in the current study.

Screen-Based Media Use and Empathy Quotient (EQ)

Although a positive correlation was found between screen-based media use and systemizing, the current study provides no evidence suggesting that the total duration of screen-based media use is associated with Empathy Quotient (EQ). The evidence which shows that the total duration of screen time is not associated with empathy skills is shown also found in another recent study. Nabi and Wolfer (2022) conducted a study involving 400 parents of children aged 5-12 years, investigating the effects of digital media duration on emotional intelligence and its sub-set. The result of this study also found that there is no screen or digital media use related to child emotional intelligence, empathy, or emotional regulation.

Even though empathizing levels in Indonesian children did not predict by the average of duration on total screen-based media activities, the time they devoted

komputer di rumah tampil lebih baik secara signifikan pada desain blok, penyelesaian gambar, informasi, dan tes kesamaan pada *Wechsler Preschool and Primary Scale of Intelligence - Revisi (WPPSI-R)*. Terlebih lagi, anak jauh lebih baik dalam tugas penyelesaian gambar dan tugas desain blok jika mereka sering menggunakan komputer, dibandingkan dengan anak yang jarang menggunakan komputer (secara bulanan atau kurang dari ini; Li & Atkins, 2004). Secara tradisional, tes *Wechsler Preschool and Primary Scale of Intelligence - Revisi (WPPSI-R)* mengukur penalaran *fluid*, pemrosesan spasial, perhatian terhadap detail, dan integrasi motorik visual (Lichtenberger, 2005).

Tugas kinerja ini terkait dengan sifat sistemisasi. Sebagai contoh adalah tes desain balok, yang meminta anak untuk menyalin desain, baik dari desain yang dibuat oleh eksperimen atau dari desain di buku, membutuhkan kemampuan untuk merekam desain sebelum menerjemahkannya ke dalam karya mereka sendiri. Subtes melengkapi gambar menginstruksikan anak untuk mengidentifikasi bagian yang hilang dari gambar yang tidak lengkap, sedangkan subtes kesamaan meminta anak untuk mengidentifikasi gambar yang mirip dan menjelaskan kesamaan di antara mereka. Kedua tes tersebut membutuhkan kemampuan untuk menganalisis dan mendeteksi detail (Wechsler, 1989). Maka dari itu, studi ini menyediakan dukungan tambahan untuk hubungan antara penggunaan media dan perilaku sistematisasi yang ditemukan dalam studi ini.

Penggunaan Media Berbasis Layar dan Empathy Quotient (EQ)

Walaupun korelasi positif ditemukan antara penggunaan media berbasis layar dan sistemisasi, studi ini tidak memberikan bukti yang menunjukkan bahwa total durasi penggunaan media berbasis layar terkait dengan *Empathy Quotient (EQ)*. Bukti yang menunjukkan bahwa total durasi waktu layar tidak terkait dengan keterampilan empati juga ditemukan dalam studi terbaru lainnya. Nabi dan Wolfer (2022) melakukan studi yang melibatkan 400 orang tua dari anak usia 5-12 tahun, dan menyelidiki pengaruh durasi media digital terhadap kecerdasan emosional dan subsetnya. Hasil studi ini juga menemukan bahwa tidak ada penggunaan layar atau media digital yang berhubungan dengan kecerdasan emosi, empati, atau pengendalian emosi anak.

Meskipun tingkat empati pada anak Indonesia tidak diprediksi oleh rerata durasi aktivitas media berbasis layar total, namun ini diprediksi oleh waktu yang mereka

to television watching and gaming does. This finding indicates that the association of screen-based media and empathy is more content dependent. The current study demonstrates a significant correlation between watching activities and gaming with empathy in inverse relationship, suggesting a clear effect of screen-based media devices on a child's empathizing level. The correlation indicates an inverse direction; as a child spends more time on watching activities or playing video games, their empathizing score decreases, and vice versa.

Watching television will affect a child's level of empathy because children often relate themselves with a character in a television program or video they see. Therefore, repeated exposure to (negative) television content poses risks for children, affecting how they learn about empathy or share emotions with others. Hence, the effects of screen-based media use on children's emotions are not solely attributable to their levels of media exposure; the content of the programs viewed also has a significant impact on their emotions as well (Wilson, 2008).

Similar to watching activities, the effect of gaming on empathy also seems to be content dependent. A recent experimental study has confirmed that prosocial video games showed significant positive association with empathy (Gentile et al., 2009; Harrington & O'Connell, 2017), whereas frequently aggressive content gaming decrease the emotional and cognitive empathy (Siyez & Baran, 2017). In this case, prosocial video games are believed to stimulate the tendency to maintain positive affective relationships, cooperation and sharing as well as empathy (Harrington & O'Connell, 2017). Gentile et al. (2009) in their longitudinal study about the effects of prosocial gaming explained that a repeated video games exposure could produce certain long-term effects such as changes to cognitive construct, cognitive-emotional constructs, and affective traits. Therefore, the relation of gaming which decreases the level of empathy is probably caused by its negative content.

Screen-Based Media Use, Extreme Male Brain, and Autistic Spectrum Quotients (AQ)

An expected correlation between the total duration of screen-based media use and autistic traits was not found in the current study. In line with this finding, an earlier study on typically developing adults in the Netherlands also reported that autistic traits were not significantly

habiskan untuk menonton televisi dan bermain *game*. Temuan ini menunjukkan bahwa hubungan media berbasis layar dan empati lebih bergantung pada konten. Studi ini menunjukkan korelasi yang signifikan antara aktivitas menonton dan bermain *game* dengan empati dalam hubungan terbalik, menunjukkan efek yang jelas dari perangkat media berbasis layar pada tingkat empati anak. Korelasi menunjukkan arah yang berlawanan; ketika seorang anak menghabiskan lebih banyak waktu untuk menonton aktivitas atau bermain *video game*, skor empati mereka menurun, begitu pula sebaliknya.

Menonton televisi akan mempengaruhi tingkat empati anak karena anak sering mengkaitkan dirinya dengan tokoh dalam acara televisi atau video yang dilihatnya. Maka dari itu, paparan berulang terhadap konten televisi (negatif) menimbulkan risiko bagi anak, yang memengaruhi cara mereka belajar tentang empati atau berbagi emosi dengan orang lain. Oleh karena itu, efek penggunaan media berbasis layar pada emosi anak tidak semata-mata disebabkan oleh tingkat keterpaparan media mereka; konten program yang dilihat juga memiliki dampak yang signifikan terhadap emosi mereka (Wilson, 2008).

Serupa dengan aktivitas menonton, pengaruh bermain *game* terhadap empati juga tampaknya bergantung pada konten. Sebuah studi eksperimental terkini telah mengkonfirmasi bahwa *video game* prososial menunjukkan hubungan positif yang signifikan dengan empati (Gentile et al., 2009; Harrington & O'Connell, 2017), sedangkan konten game yang sering agresif menurunkan empati emosional dan kognitif (Siyez & Baran, 2017). Dalam hal ini, video game prososial diyakini dapat merangsang kecenderungan untuk mempertahankan hubungan afektif yang positif, kerja sama dan berbagi, serta empati (Harrington & O'Connell, 2017). Gentile et al. (2009) dalam studi longitudinal mereka tentang efek *gaming* prososial menjelaskan bahwa paparan *video game* berulang dapat menghasilkan efek jangka panjang tertentu seperti perubahan konstruk kognitif, konstruk kognitif-emosional, dan sifat afektif. Oleh karena itu, hubungan *game* yang menurunkan tingkat empati kemungkinan disebabkan oleh konten negatifnya.

Penggunaan Media Berbasis Layar, Otak Laki-Laki Ekstrim, dan Autistic Spectrum Quotients (AQ)

Korelasi yang diharapkan antara durasi total penggunaan media berbasis layar dan sifat autistik tidak ditemukan dalam studi ini. Sejalan dengan temuan, studi terdahulu pada orang dewasa dengan perkembangan umum di Belanda juga melaporkan bahwa sifat autistik

associated with the duration of their Internet use, but rather had more to do with the compulsivity of their Internet use (Finkenauer et al., 2012). Compulsivity, as mentioned in the previous study on adults, is more about users' attachments to the media and their intentions while using it. The more an individual is compulsively attached to a device, the more difficult detachment from the media will be.

Although a correlation between the total duration of media use and autistic traits was not found, the activity of playing video games demonstrated a specific relation to autistic traits. The Autistic Spectrum Quotient (AQ) showed a positive correlation with gaming activity, indicating that, as time spent on playing games increases, the Autistic Spectrum Quotient (AQ) score tend to increase with it. This fact was not surprising, since children with Autistic Spectrum Disorder (ASD) have been reported to have significantly greater levels of problematic use of video gaming than typically developing children do (Mazurek et al., 2012). Gaming activities associate with low social skills, which are known to be one of the core impairments in autistic children. Lower social competence also predicted increases over time in pathological gaming behaviors (Gentile et al., 2011).

Unlike the non-significant finding with the autistic traits, screen-based media use is found to correlate positively with the extreme male brain as indicates by D-Score. The positive correlation between the total duration of screen-based media use with the D-Score indicates that high screen-based media use in children is related to a stronger male brain tendency, specifically, a high level of systemizing and a low level of empathizing. High levels of systemizing have to do with the triad deficits in islets of ability, obsession with systems, and repetitive behavior. Conversely, low levels of empathizing express the triad deficit in social interaction, communication, and imagining another's mind (Baron-Cohen & Belmonte, 2005). Looking further to the screen activities, watching and gaming activities were the only screen activities that significantly correlated with the D-Score.

Conclusion

Based on the explanation provided, this study shows the empirical evidence about the relation between screen-based media use and autistic features in Indonesian children. In particular, the findings suggest

tidak berasosiasi secara signifikan dengan durasi penggunaan Internet, namun lebih pada kompulsivitas penggunaan Internet (Finkenauer et al., 2012). Kompulsivitas, seperti dijelaskan dalam studi terdahulu, adalah lebih pada kelekatan penggunaan pada media dan intensi penggunaan. Semakin lekat secara kompulsif pada media, semakin sulit lepas dari media tersebut.

Walaupun ada korelasi antara total durasi penggunaan media dan sifat autistik tidak ditemukan, aktivitas bermain *video game* menunjukkan relasi spesifik dengan sifat autistik. *Autistic Spectrum Quotient (AQ)* menunjukkan korelasi positif dengan aktivitas *game*, mengindikasikan bahwa semakin banyak waktu bermain *game*, skor *Autistic Spectrum Quotient (AQ)* cenderung juga meningkat. Hal ini tidak mengherankan, karena anak dengan *Autistic Spectrum Disorder (ASD)* telah dilaporkan memiliki level penggunaan *video game* yang bermasalah lebih tinggi dibandingkan anak dengan perkembangan umum (Mazurek et al., 2012). Aktivitas *game* berasosiasi dengan kemampuan sosial rendah, yang merupakan kekurangan utama dalam anak autistik. Kompetensi sosial yang lebih rendah juga diprediksi meningkat seiring waktu dalam perilaku bermain *game* secara patologis (Gentile et al., 2011).

Berbeda dengan temuan tidak signifikan dengan sikap autistik, penggunaan media berbasis layar berkorelasi positif dengan otak laki-laki ekstrim, terlihat dari *D-Score*. Korelasi positif antara total durasi penggunaan media berbasis layar dengan *D-Score* mengindikasikan bahwa penggunaan media berbasis layar yang tinggi pada anak berhubungan dengan kecenderungan otak laki-laki yang lebih kuat, secara spesifik adalah tingkat sistemisasi yang tinggi dan tingkat empati yang rendah. Tingkat sistemisasi tinggi berhubungan dengan kekurangan pada kemampuan, obsesi dengan sistem, dan perilaku berulang. Kebalikannya, tingkat empati yang rendah berhubungan dengan kekurangan dalam interaksi sosial, komunikasi, dan imaginasi atas pikiran orang lain (Baron-Cohen & Belmonte, 2005). Mengaji aktivitas layar lebih lanjut, hanya menonton dan aktivitas *game* yang berkorelasi signifikan dengan *D-Score*.

Simpulan

Berdasarkan penjelasan yang telah tersedia, studi ini menunjukkan bukti empiris tentang hubungan antara penggunaan media berbasis layar dan fitur autistik pada anak Indonesia. Tepatnya, temuan studi ini melihat

screen-based media use as the predictor of empathizing, systemizing, and extreme male behavior. From the results, it can be concluded that: (1) for Indonesian children, the total time spent on screen-based media use predicted the Systemizing Quotient (SQ) and the extreme male brain features, and is less likely associated with the Empathy Quotient (EQ); and (2) the relation of screen-based media use on variable measured was typically content dependent. Gaming and watching activities were significantly predicted the increase of extreme male behavior and the decrease of children's empathy, suggesting them as a problematic screen type activity. On the other hand, systemizing behavior particularly predicted by the time devoted on browsing Internet and doing homework.

The evidence leads to important implications for clinical and educational setting. Despite the fact that screen-based media use contribution is relatively small to autistic features, the correlation indicates that media use significantly relates to the development of autistic characteristic. Therefore, it is important for parents to create regulations in controlling the children's media use. The prevention for adverse effects of excessive media use (regarding its effects for children's empathy) is urgently needed. The evidence given also gives an idea for clinicians for building treatment intervention, for example suggesting a screen-diet for children who have autistic-like features or even more autistic children to suppress the symptom escalations due to vulnerability of screen exposure.

The finding that screen-based media use positively correlates with systemizing skills, may indicate that media use supports the development of analytical brain. Therefore, using screen technologies for training children's analytical capabilities should also be useful, for example use mobile learning to teach math or programming. Nevertheless, a structure, clarity of regulation, and positive guidance for the school is extremely required to promote a safe environment for children to learn from mobile learning.

Since the development of empathy is negatively correlated with watching activities (television, videos, and movies) and gaming, it becomes important to examine the content of those media which hugely expose to children. Parents and related stakeholders need to take care about what children watch and play.

penggunaan media berbasis layar sebagai prediktor perilaku berempati, sistematis, dan perilaku laki-laki ekstrem. Dari hasil tersebut dapat disimpulkan bahwa: (1) untuk anak Indonesia, total waktu yang dihabiskan untuk penggunaan media berbasis layar memprediksi *Systemizing Quotient (SQ)* dan fitur otak laki-laki yang ekstrim, dan kecil kemungkinannya terkait dengan *Empathy Quotient (EQ)*; dan (2) hubungan penggunaan media berbasis layar pada variabel yang diukur cenderung bergantung pada konten. Kegiatan bermain *game* dan menonton secara signifikan memprediksi peningkatan perilaku laki-laki yang ekstrim dan penurunan empati anak, yang menunjukkan bahwa hal ini adalah jenis aktivitas layar yang bermasalah. Di sisi lain, perilaku sistematisasi diprediksi oleh waktu yang dihabiskan untuk menjelajahi Internet dan mengerjakan pekerjaan rumah.

Bukti mengarah pada implikasi penting untuk lingkup klinis dan pendidikan. Terlepas dari temuan bahwa penggunaan media berbasis layar berkontribusi relatif kecil terhadap fitur autistik, korelasi menunjukkan bahwa penggunaan media secara signifikan berhubungan dengan perkembangan karakteristik autistik. Oleh karena itu, penting bagi orang tua untuk membuat peraturan dalam mengontrol penggunaan media oleh anak. Pencegahan dampak buruk dari penggunaan media yang berlebihan (terkait dampaknya terhadap empati anak) sangat dibutuhkan. Bukti yang diberikan juga memberikan ide bagi praktisi klinis untuk membangun intervensi rawatan, misalnya menyarankan diet layar (*screen diet*) untuk anak yang memiliki fitur menyerupai autisme atau bahkan lebih kepada ranah autistik untuk menekan eskalasi gejala karena kerentanan paparan layar.

Temuan bahwa penggunaan media berbasis layar berkorelasi positif dengan keterampilan sistemisasi, dapat mengindikasikan bahwa penggunaan media mendukung perkembangan otak analitis. Maka dari itu, penggunaan teknologi layar untuk melatih kemampuan analitis anak juga harus bermanfaat, sebagai contoh adalah dengan menggunakan pembelajaran seluler untuk mengajar matematika atau pemrograman. Walaupun demikian, struktur, kejelasan peraturan, dan bimbingan positif bagi sekolah sangat diperlukan untuk mendorong lingkungan yang aman bagi anak untuk belajar dari *mobile learning*.

Perkembangan empati berkorelasi negatif dengan aktivitas menonton (televisi, video, dan film) dan *game*, dan maka dari itu, adalah penting untuk memeriksa konten media tersebut yang sangat terpapar pada anak. Orang tua dan pemangku kepentingan terkait perlu memperhatikan apa yang ditonton dan dimainkan anak.

Therefore, developing a diet for watching and gaming activities is to be recommended. Apart from this, it is also important to strengthen the capacity of schools and parents in supporting children's readiness about screen-media use by promoting workshop, seminars, or training which teach how to develop an intervention plan for children screen activities.

Limitations and Suggestions

The present study has several limitations. Firstly, the data were derived from parental reports, which may carry problems or biases. The measures depend on parent's capacity to reflect on their children's behavior. Therefore, parents might complete the behavioral questionnaires as what is been expected by the society, thus leading to a high socially desirable response. However, one advantage of such reports is that parents have the opportunity to judge their children's behavior, skills, strengths, and weaknesses in a variety of contexts over an extended period of time. Nevertheless, in the future, it may be advantageous to use performance tasks as a compared measurement to assess the empathizing, systemizing, and autistic traits besides the measurement scales. Also, it may be advantageous to use performance tasks to assess sex differences in empathizing and systemizing, and the distribution of cognitive styles in children as well.

Secondly, another potential limitation concerns the screen-based media use survey, where parents relied more on their remembering capacities when reporting their child screen consumption, which potentially can be less accurate. However, the optional answer available on the scale and the suggestion to ask their children provided an opportunity for parents to decently estimate their children media use habit, reducing error when answering. It is suggested to implement a week diary report which records the daily screen-based media consumption, to help parents obtaining more accurate data.

For future study, an experimental study in this area is required to confirm the current findings, in determining the consistency in the causal relationship between variables measured. It will be particularly important to determine whether such the effects of media are significant even after controlling another contextual

Oleh karena itu, menerapkan peraturan pemakaian (atau *screen diet*) untuk aktivitas menonton dan bermain *game* sangat dianjurkan. Selain itu, penting juga untuk memperkuat kapasitas sekolah dan orang tua dalam mendukung kesiapan anak tentang penggunaan media layar dengan mempromosikan lokakarya, seminar, atau pelatihan yang mengajarkan bagaimana mengembangkan rencana intervensi untuk aktivitas layar anak.

Keterbatasan dan Saran

Studi ini memiliki sejumlah keterbatasan. Pertama, data berasal dari laporan orang tua, yang mungkin menjadi kendala atau bias. Seluruh pengukuran bergantung pada kapasitas orang tua untuk merefleksikan perilaku anak mereka. Oleh karena itu, orang tua dapat mengisi kuesioner perilaku seperti yang diharapkan oleh masyarakat, sehingga menghasilkan respon yang diharapkan secara sosial. Namun, salah satu keuntungan dari laporan tersebut adalah bahwa orang tua memiliki kesempatan untuk menilai perilaku, keterampilan, kekuatan, dan kelemahan anak mereka dalam berbagai konteks selama jangka waktu yang lama. Kendati demikian, di masa depan, akan lebih menguntungkan untuk menggunakan *performance tasks* (tugas kinerja) sebagai ukuran perbandingan untuk menilai kemampuan berempati, sistematisasi, dan ciri autistik, selain skala pengukuran yang digunakan di studi ini. Selain itu, mungkin akan bermanfaat untuk menggunakan *performance tasks* untuk menilai perbedaan jenis kelamin dalam berempati dan sistemisasi, dan juga distribusi gaya kognitif pada anak.

Kedua, batasan potensial lainnya menyangkut survei penggunaan media berbasis layar, ketika orang tua lebih mengandalkan kapasitas mengingat mereka saat melaporkan konsumsi layar anak mereka, yang berpotensi menjadi kurang akurat. Namun, pilihan jawaban yang tersedia pada skala dan saran untuk bertanya kepada anak mereka memberikan kesempatan bagi orang tua untuk memperkirakan kebiasaan penggunaan media anak mereka, sehingga mengurangi kesalahan saat menjawab. Disarankan untuk menggunakan buku harian mingguan yang mencatat waktu penggunaan media berbasis layar harian, untuk membantu orang tua memperoleh data yang lebih akurat.

Untuk studi berikutnya, studi eksperimental di bidang ini diperlukan untuk mengkonfirmasi temuan dari studi ini, dalam menentukan konsistensi hubungan kausal antara variabel yang diukur. Akan sangat penting untuk menentukan apakah efek media tersebut signifikan bahkan setelah mengontrol variabel kontekstual lain,

variable, e.g., media usage level (low, medium, high), gender, age group, and screen type activities. Furthermore, it is also intriguing to find the short-term and long-term direct effects of media use on autistic features through a longitudinal study design or a five year follow up study. Since none of the relationships were found between Autistic Spectrum Quotient (AQ) or autistic traits with the total duration of screen-based media use, a concern related the possible roles of compulsivity of the screen-based media use need to be considered since studies in adults have reported a relation with autistic traits.

misalnya, tingkat penggunaan media (rendah, sedang, tinggi), jenis kelamin, kelompok usia, dan aktivitas jenis layar. Selain itu, juga menarik untuk menemukan efek langsung jangka pendek dan jangka panjang dari penggunaan media pada fitur autistik melalui desain studi longitudinal atau studi tindak lanjut (*follow-up*) lima tahun. Hasil menunjukkan bahwa tidak ada hubungan yang ditemukan antara *Autistic Spectrum Quotient (AQ)* atau sifat autistik dengan durasi total penggunaan media berbasis layar, maka perhatian perlu dipertimbangkan terhadap kemungkinan peran kompulsif penggunaan media berbasis layar karena studi pada orang dewasa telah melaporkan hubungannya dengan ciri autisme.

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