

## ARTICLE

# Framework for Rating and Assessing Media for Early childhood (FRAME): A multidimensional coding system for analysing children's media content

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## Abstract

Young children spend an increasing amount of time engaging with screens, including television viewing. Although most research has focused on the quantity of children's viewing, growing evidence suggests that the developmental effects of screen media depend on the quality and characteristics of the content. However, there is currently no comprehensive, developmentally informed framework for systematically assessing the features of child-directed media. We developed the Framework for Rating and Assessing Media for Early childhood (FRAME), a multidimensional content analysis framework grounded in developmental literature that measures prosocial, antisocial and aggressive, educational, emotional, cultural, mental state talk and pacing content in children's television shows. The FRAME was applied to older ( $N=22$ ) and contemporary ( $N=10$ ) television shows watched by preschool-aged (2–5 years) children in Aotearoa New Zealand to characterize their content. Inter-rater reliability across dimensions and coding categories was acceptable to excellent. Convergent validity was demonstrated through correlations with Common Sense Media ratings, while also highlighting the value of a comprehensive and differentiated coding framework beyond existing measures. These findings demonstrate the reliability and validity of the FRAME and its potential to advance research examining how specific features of child-directed media relate to developmental outcomes.

## KEYWORDS

coding system, content analysis, media, preschooler, screen time, television, young children

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## Statement of Contribution

### What is already known

- Television and video viewing remain the most common type of screen media consumed by young children.
- Content features of media can have both positive and negative effects on child development.

### What the present study adds

- A multidimensional framework (FRAME) for assessing child-directed media is presented.
- Results support the inter-rater reliability and convergent validity of the FRAME.
- Applications are discussed, including interactions of media content features and links to child outcomes.

## BACKGROUND

Young children today spend an unprecedented amount of time watching or interacting with screens. Despite the recent explosion in newer forms of digital devices (e.g. smartphones, tablets), television and video viewing remains the most common type of screen media consumed by young children (Rideout & Robb, 2020). In this paper, we use the term *television viewing* to refer broadly to children's viewing of television programmes and programme-like video content, regardless of delivery platform. This includes content accessed via broadcast television as well as through streaming services (e.g. Netflix) and online video platforms (e.g. YouTube). In Aotearoa New Zealand, the location of the present research, young children aged 2–5 years old spend around 2 h per day engaging with screens (Stewart et al., 2019). Data from the *Growing Up in New Zealand* study found that 56% of two-year-olds exceeded the government-recommended guideline of 1 h or less on screens per day, which rose to 82% at age 4.5 years (Stewart et al., 2019). Numerous studies have investigated links between the amount of time children spend on screens and their health and well-being (Eirich et al., 2022; Stiglic & Viner, 2019), often finding that high levels of screen exposure in early childhood are associated with poorer psychosocial, behavioural and educational outcomes (Corkin et al., 2021; Gath et al., 2023; Li et al., 2020; Stewart et al., 2019).

While a substantial amount of the literature has focused on the amount of time children spend on screens, less consideration has been given to the quality of the content they are exposed to during that time (e.g. Corkin et al., 2021; Eirich et al., 2022; Gueron-Sela & Gordon-Hacker, 2020; Li et al., 2020; Madigan et al., 2019). This emphasis on screen time alone provides only a partial understanding of children's media experiences, given evidence that some types of media content can have positive impacts on children's development, including beneficial effects on prosocial behaviour and empathy (Coyné et al., 2018; Mares & Woodard, 2005; Rasmussen et al., 2016), language skills (Linebarger, 2006; Pasnik et al., 2007; Wright et al., 2001) and early literacy and numeracy skills (Howard Gola et al., 2013; Pasnik et al., 2007; Vandewater & Bickham, 2004). Thus, to fully understand associations between children's media use and development, it is necessary to examine the quality of the media content they are exposed to through comprehensive and systematic means.

Despite growing recognition of the importance of media quality, there is limited theoretical guidance for systematically identifying and evaluating the specific content features that may influence children's developmental outcomes. Similarly, screen time recommendations often advise parents to choose 'high-quality' content, yet provide relatively little guidance on what makes screen media high-quality or educational (American Academy of Child and Adolescent Psychiatry, 2024; CDC, 2024; Hill et al., 2016; Raising Children, 2024; Wilkinson et al., 2021). Understanding the specific features that make children's

television and video content 'high-quality' could therefore advance research on children's media use while also helping parents make more informed decisions about their child's screen use. There is therefore a clear need for a comprehensive and systematic framework for characterizing the content of television and video media developed for young children, and for investigating how specific content features relate to developmental outcomes.

## Positive effects of media content

Research suggests that child-directed media can support children's development in multiple domains, particularly social–emotional, language and educational development, depending on the characteristics of the content. Positive impacts of child-directed media have largely focused on social and emotional skills, and language and educational skills. For example, viewing prosocial media is associated with higher prosocial behaviour and lower aggression (Coyne et al., 2018; Padilla-Walker et al., 2015; Prot et al., 2014). A meta-analysis of 72 studies found that exposure to prosocial media was associated with higher levels of prosocial behaviour and empathic concern (Coyne et al., 2018), while Rasmussen et al. (2016) reported higher empathy and emotion regulation when parents actively mediated socially and emotionally focused content. Based on the General Learning Model, repeated exposure to prosocial media may help children develop cognitive scripts and norms that foster prosocial beliefs and behaviours (Padilla-Walker et al., 2024).

Educational content has also been associated with positive language, literacy and numeracy outcomes. For example, educational programmes such as *Dora the Explorer* and *Blue's Clues* have been linked to larger vocabularies and greater expressive language, possibly because they use proto-conversational strategies such as asking questions directly to viewers (Linebarger & Walker, 2005). Child-directed media may also support numeracy learning, although evidence suggests these benefits are greater when children are familiar with the media character (Howard Gola et al., 2013; Lauricella et al., 2011).

Beyond prosocial and educational content, developmental research suggests that additional features of child-directed media may also support children's development, despite receiving comparatively little attention in media research. For example, children's exposure to mental state talk and emotion language has been associated with stronger social understanding, emotion knowledge and emotion regulation in parent–child interactions (Barrett, 2017; Cole et al., 2010; Devine et al., 2016; Hoemann et al., 2019; Ogren & Sandhofer, 2022; Ruffman et al., 2002; Symons et al., 2005; Tompkins et al., 2018). Although this research has primarily focused on interpersonal contexts, child-directed media may also expose children to these forms of language. Similarly, exposure to diverse and inclusive cultural representations may contribute to children's developing sense of identity and attitudes towards others (Cameron et al., 2006; Pike & Jennings, 2005; Ward, 2004). Together, these findings suggest that a broad range of theoretically informed content features should be considered when evaluating the developmental quality of children's media.

## Negative effects of media content

Although child-directed media can promote positive developmental outcomes, certain types of content may adversely affect children's social, emotional and behavioural development, particularly when they depict violence or aggression. Numerous studies have demonstrated that exposure to aggressive or violent media predicts more aggressive behaviour (Bender et al., 2018; Coyne & Archer, 2005; Linder & Gentile, 2009; Padilla-Walker et al., 2015). Even in very early childhood (from age 6 months), exposure to media violence has been found to predict increased aggressive behaviour and emotional reactivity 1 year later, while controlling for family background characteristics (Chonchaiya et al., 2015). Christakis and Zimmerman (2007) found that exposure to violent television viewing during the preschool years (aged 2–5) predicted antisocial behaviour 5 years later within boys but not girls. Just as children may

learn prosocial norms and cognitive scripts from repeated exposure to prosocial media content, when children are exposed to antisocial themes and content through media, they may internalize these antisocial norms. In addition, fear and anxiety can result from exposure to media content that is violent or depicts disturbing or traumatic events (Cantor, 2001).

## Multidimensional approach to coding children's media

While research has identified specific features of children's media that can influence their behaviour and development, there is a paucity of research examining how multiple dimensions of television content interact together to influence development. However, several established content-analytic coding systems provide precedent for coding children's media across multiple theoretically meaningful domains (Holmgren et al., 2023; McHarg et al., 2022; Taggart et al., 2019).

For example, McHarg and Hughes (2021) coded toddler's television programming for prosocial, antisocial, conversational and pacing features and examined links with behaviour development. The authors reported an interaction between prosocial content and pacing, where programmes that had longer scenes (slower paced) *and* were highly prosocial were associated with more sharing behaviours in toddlers. This interaction between television features supports the multidimensional approach. Furthermore, Holmgren et al. (2023) ranked the prosocial, aggressive and educational nature of children's television to identify profiles of viewing habits. Three TV diets were identified and labelled as 'low content', 'high aggressive content' and 'high child-centred media'. Children in the 'high aggressive content' profile showed higher levels of relational aggression and lower levels of prosocial behaviour 1 year later. All three groups spent a similar amount of time watching TV, which highlights the importance of examining TV quality, beyond quantity. However, a parent-reported global score was used to rank the different content types. This may be susceptible to reporter bias and less robust than an objective, frequency-based measurement (Holmgren et al., 2023). Applying a frequency-based coding scheme, for example by assessing how often specific behaviours occur (i.e. number of times a character helps others), offers a more detailed approach to content analysis and can enhance our understanding of child-directed programming (McHarg et al., 2022).

Thus, existing systems for undertaking content analysis of child-directed media focus on a limited number of domains (e.g. Holmgren et al., 2023; McHarg & Hughes, 2021) or rely on parent-reported global scores (e.g. Holmgren et al., 2023). In the present research, we aimed to develop an overarching framework for assessing child media across multiple developmental domains. In determining the domains of focus for our coding framework, consideration was given to the types of content that other researchers had commonly examined in previous research on children's media (Coyne & Archer, 2004; Linebarger et al., 2017; McHarg et al., 2022; McHarg & Hughes, 2021; Padilla-Walker et al., 2013) as well as domains where less research had been conducted related to child-directed media, but where we believed evidence from interpersonal interactions and children's literature may extend to child-directed media as well (Austin, 2024; Christensen & Myford, 2014; Tompkins et al., 2018; Wang, 2021).

## Theoretical foundations

Guided by developmental theory, the present coding framework was designed to capture core dimensions of media content that are theoretically implicated in children's development. The inclusion of prosocial and aggressive/antisocial content is grounded in Social Cognitive Theory (Bandura, 1986), which posits that children learn behaviours, norms and emotional responses through observing modelled actions. Media characters function as symbolic models whose behaviours may shape children's expectations regarding appropriate social conduct. Prosocial portrayals (e.g. helping, sharing, cooperation) provide models of empathy and constructive problem solving, whereas exposure to aggression may contribute to hostile attribution biases and maladaptive behavioural scripts (Crick & Dodge, 1994). From a

social information processing perspective, repeated exposure to particular behavioural patterns can influence how children interpret social cues and generate responses in real-world interactions. Coding both prosocial and antisocial content therefore captures the normative social scripts embedded within children's media environments.

Emotion words, behaviours and mental state talk were included based on research in socioemotional development and theory of mind. Children's understanding of emotions, beliefs and desires develops through exposure to language that references internal states (Wellman, 2014). Mental state discourse supports perspective-taking and social reasoning, while explicit labelling and depiction of emotions facilitate emotion recognition and regulation. Media containing frequent references to feelings, intentions and beliefs may function as an additional context for socio-cognitive learning. These domains were thus selected to index the extent to which programmes provide developmentally relevant emotional and mental state input.

Educational content was included in recognition of constructivist learning principles and research demonstrating that children can acquire academic knowledge from developmentally designed programming (Fisch, 2004). Educational narratives that scaffold concepts within engaging storylines can support early literacy, numeracy and problem-solving skills.

Pace was coded as a structural feature informed by cognitive processing theories. Because attentional control and executive functions are still developing in childhood, rapid pacing may tax cognitive resources and affect comprehension (Lillard & Peterson, 2011). Including pace acknowledges that developmental impact is shaped not only by thematic content but also by formal production features.

Finally, cultural consciousness was included to reflect media's role in social identity development and the formation of intergroup attitudes (Bigler & Liben, 2007). Developmental and ecological frameworks emphasize that children construct understandings of social groups, fairness and belonging within broader sociocultural systems (Bronfenbrenner, 1979). Media representations contribute to children's emerging beliefs about whose identities are valued, how diversity is portrayed and how cultural differences are navigated. Exposure to inclusive and culturally responsive portrayals may support positive identity development and reduce bias, whereas stereotyped or exclusionary depictions may reinforce inequities (Rivas-Drake et al., 2014). Coding cultural consciousness therefore captures the sociocultural messages embedded within children's media environments.

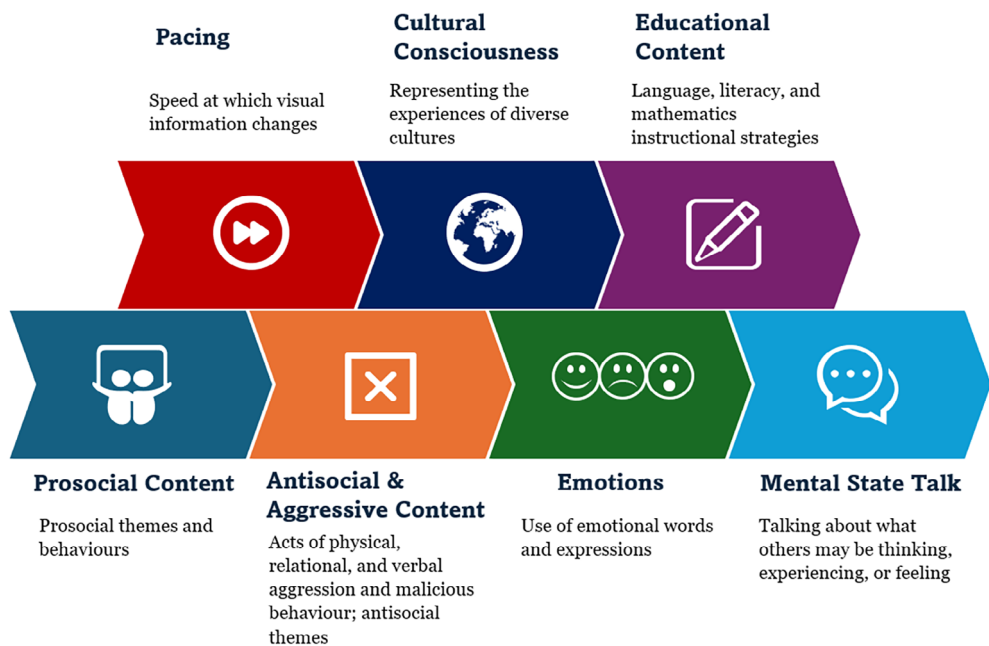
Together, these seven domains reflect a developmentally informed framework conceptualizing children's television as a source of behavioural models, socioemotional discourse, cognitive scaffolding and structural processing demands within children's broader ecological systems (Bronfenbrenner, 1979). Figure 1 depicts this multidimensional framework.

## Current study

There is a clear need for a comprehensive and systematic approach to analysing the content of children's media programming for the purposes of understanding and describing this content as well as examining impacts on child development. In the current study, we developed a content analysis framework for assessing the features of young children's television across seven domains. We applied this framework to 32 children's television shows in order to demonstrate the reliability and validity of the coding system, as well as to describe the features of popular television shows developed for young children. Our specific aims were to:

1. Develop a multidimensional coding system for assessing children's media programming.
2. Demonstrate the reliability and validity of the coding system.
3. Describe the features of popular children's television programming based on the coding framework.

To examine the convergent validity of our coding system, we examined associations with ratings provided by Common Sense Media (<https://www.commonsensemedia.org/>) where available.



**FIGURE 1** Framework for rating and assessing media for early childhood.

Common Sense Media (CSM) is a nonprofit organization that provides ratings and reviews on movies, television programmes, games, books and more for parents and educators. Ratings and reviews for media content are provided according to educational value, positive messages, positive role models and representations, language, sex, violence, consumerism and drinking, drugs and smoking. CSM reports that their recommendation lists are consulted by over 80 million parents and educators a year (Common Sense Media, 2018). Given its popularity and open-source accessibility, recent research studies have used CSM ratings as an alternative to manually coding media content (Aley & Hahn, 2023; Feng & Zhu, 2022). Examining associations of our coding system with CSM ratings helps to validate the newly developed system, as well as examine whether the coding system offers anything beyond existing CSM ratings. In evaluating the convergent validity of the FRAME, we hypothesized that:

- CSM educational value ratings would be significantly positively associated with FRAME educational content scores;
- CSM positive messages and CSM positive role models ratings would be significantly positively associated with FRAME prosocial content scores; and
- CSM violence ratings would be significantly positively associated with FRAME antisocial content scores and aggression frequency scores.

## METHODS

### Development of the Framework for Rating and Assessing Media for Early childhood (FRAME)

Below we outline the development of each domain of the coding system, including any existing coding schemes that were selected, adapted, or otherwise informed the development of the system, which

we have named the *FRAME*. The full coding system is provided in [Appendix S1](#) and detailed coding examples are provided on the Open Science Framework at <https://doi.org/10.17605/OSF.IO/CZY72>.

## Prosocial content

The prosocial domain of the *FRAME* has been adapted from previous schemes developed by Padilla-Walker et al. (2013) and Taggart et al. (2019). Two prosocial scores are used: a frequency count of prosocial behaviours and a global score of prosocial content. For the prosocial behaviour frequency count, we tallied the number of prosocial behaviours and utterances related to sharing, helping, compassion, empathy, caring, manners, praise and encouragement, following the definitions of prosocial behaviour from Padilla-Walker et al. (2013) that have been used in subsequent research (Feng & Park, 2015; Padilla-Walker et al., 2015). Prosocial behaviours were counted as separate instances if there were 5 s between each act, or they involved different characters (target and/or actor). In parallel to the frequency count of prosocial behaviour, we also calculated a global prosocial score, adapted from Taggart et al. (2019). Taggart et al. (2019) utilized a global prosocial content score from 1 (poor exemplar) to 5 (excellent exemplar). An 'excellent exemplar' referred to a television programme with a central prosocial theme and frequent prosocial behaviours (such as helping and sharing). On the other hand, if the television programme contained infrequent prosocial behaviours or was antisocial, it was coded as a 'poor exemplar'. In our study, we used a global prosocial content score ranging from 1 to 3 (1 = Episode is poor exemplar of prosocial behaviour; 2 = Some prosocial behaviour evident in episode; 3 = Prosocial behaviour is central to the episode) (see [Appendix S1](#)). Thus, the *FRAME* results in two prosocial scores: the total count of prosocial behaviours/utterances and a global prosocial score.

## Antisocial and aggressive content

In this domain, two scores were used: global antisocial content and a frequency count of aggressive acts. First, the presence of antisocial themes and content was coded using a global antisocial score (similar to the global prosocial score) ranging from 1 to 3 (1 = Episode is poor exemplar of antisocial behaviour, 2 = Some antisocial behaviour evident in episode, 3 = Antisocial behaviour is central to the episode) (see [Appendix S1](#)). Antisocial behaviours could include violating rules or social norms, harming others or modelling behaviours that discourage empathy, cooperation or rule-following.

Second, a frequency-based measure of aggressive acts was adapted from the coding schemes of Linder and Gentile (2009) (modified version of Coyne & Archer's scheme from 2004) and Smith et al. (2006). Linder and Gentile (2009) categorized aggressive behaviour into physical, relational and verbal aggression. Each type of aggression was coded as 0 (Not present) or 1 (Present). Physical aggression was defined as '*attempts to harm physically or threaten to harm someone or their possessions*' such as hitting or threatening another person with or without a weapon. Relational aggression was defined as '*attempts to harm another person's reputation, social status, or relationships, or the use of a relationship to manipulate or cause harm*' including humiliation of others or trying to break up someone else's relationship. Verbal aggression was characterized as '*direct attempts to hurt someone's feelings using words or gestures*' such as teasing or name calling. Linder and Gentile (2009) also coded each aggressive act for justification and reward. The act was justified if '*motivated by self-defense or as necessary to gain a greater good*'. The act was considered rewarded if the '*aggressor gained something positive as a result of the aggression*'. Additionally, Smith et al. (2006) coded for the presence or absence of bystanders, which we included in our study. After reviewing some of the episodes, we also decided to code for 'malicious behaviour' where there was no clear overt physical, relational or verbal aggression but the behaviours were malicious in intent (e.g. cheating, sabotage).

We also coded for the context in which the aggressive act occurred. When aggression was identified in the scene, the coder wrote a short description of the scenario identifying the antecedent (what

happened before the aggression), behaviour (the aggression) and consequences/reaction (what happened after the aggression took place). This included which character is exhibiting these behaviours (e.g. main character vs. side characters, gender, age, ethnicity, any other features of the character), the context in which the behaviours occur (e.g. at home, at school, in the community) and how behaviours are resolved and the consequences shown (if any).

## Educational content

The definition of *educational content* within children's media varies substantially, with some conceptions including the learning of prosocial behaviours and socioemotional understanding as educational (Linebarger et al., 2017; Ostrov et al., 2013). Given our multidimensional approach (and thus the inclusion of prosocial and socioemotional learning elsewhere in the framework), we constrained educational content to focus specifically on the academic skills of language, literacy and mathematics.

For language and literacy, we adapted the coding scheme from Linebarger et al. (2017). Linebarger et al. (2017) identified different types of instructional strategies within educational television content, with a focus on a much broader definition of 'educational' than the focus for our study. Linebarger et al. (2017) examined four domains of instructional strategies within children's television content: cognition and language, print and literacy, quality of character interactions and cognitive instructional support. For this study, we used Linebarger's two language factors of '*Conversation building strategies*' and '*Defining*' as our measures of educational *language* content. We used Linebarger's two print and literacy factors of '*Integrated onscreen print*' and '*Techniques and forms of onscreen print*' as our measures of educational *literacy* content. Linebarger's instructional strategies have been adapted in various ways, primarily through the combining of some coding categories together or the removal of some categories. These changes were the result of preliminary rounds of coding, where some coding categories were found to be consistently low in reliability and other categories were found to have high levels of overlap with one another.

While we did not identify any coding schemes for mathematics content in children's television, Outhwaite et al. (2023) developed a framework for analysing mathematics applications ('apps'). This coding scheme consisted of four domains of mathematical concepts ((1) number representation and relationships; (2) counting; (3) arithmetic; and (4) shape, patterns and measurement) with instructional strategies for each domain (e.g. recognition of the number of items within a set). For mathematical concepts within the FRAME, we adapted the coding scheme from Outhwaite et al. (2023). While Outhwaite et al. (2023) focused on apps for children in their first 3 years of school, the four domains of mathematical concepts map closely onto early maths models for young children (Outhwaite et al., 2019; Rittle-Johnson et al., 2017). Thus, we utilized the Outhwaite et al. (2023) framework and instructional descriptors, but combined across categories that were unlikely to occur in television content developed for children under the age of 5 (e.g. instead of including specific coding categories for addition, subtraction, multiplication and division, we created an overall coding category for arithmetic calculation; see Appendix S1).

## Emotional content

Limited research has evaluated emotional content (behaviours, words) within children's television, and existing research has focused on only a limited range of emotion words and behaviours (Austin, 2024; Christensen, 2008; Christensen & Myford, 2014; Wang, 2021). To ensure replication and reproducibility of the FRAME coding scheme, we considered broader emotion word lists within child literature (Baron-Cohen et al., 2010; Ogren & Sandhofer, 2021; Shaver et al., 1987; Sundqvist et al., 2022). Coding was completed separately for emotion behaviours and emotion words.

We examined the *emotion behaviours* within each episode using a coding scheme adapted from Grady et al. (2019) and used by others who have examined emotion behaviours in child media (Austin, 2024; Wang, 2021). This coding scheme was chosen as the emotion behaviour parameters (e.g. what a 'happiness' behaviour looks like) are fairly descriptive compared to alternatives, ensuring objective measurement and high inter-rater reliability (see Appendix S1). We coded for eight basic emotions: happiness (contentment, pride), love, curiosity/interest, surprise, anger (dislike, frustration, contempt), fear (worry), sadness (guilt) and disgust. The presence/absence of each emotion behaviour was coded every 30 s (the same emotions were only coded once every 30 s interval).

*Emotion words* were coded from episode transcripts generated through Turboscribe's transcription software (a subscription online artificial intelligence (AI) transcription software). A total sum of emotion words was generated based on a coding scheme from Baron-Cohen et al. (2010), which consists of 366 emotion words across 24 categories. Inclusion criteria involved words that describe an emotional state and are often followed by phrases such as: 'I feel ...', 'he/she looks ...' or 'he/she sounds ...'. The exclusion criteria removed bodily states that were non-emotional mental states, slang, swear words, complex vocabulary and epistemic states (Baron-Cohen et al., 2010). The proportion of emotion words relative to total words for each TV show was computed. Final scores used in this paper are the rate per minute of positive emotion behaviours, the rate per minute of negative emotion behaviours and the proportion of emotion words relative to total words.

## Mental state talk

To the best of our knowledge, there are no existing coding schemes for mental state talk in children's TV programming in the literature. However, the importance of mental state content has been investigated in storybooks (Dyer et al., 2000). References to cognitions (e.g. think or know) were the most frequently used mental state terms in books appropriate for preschool-aged children (Farkas et al., 2020). In the current study, we adapted the coding scheme from Farkas et al. (2020) (which was built on the mental state lists created by Ruffman et al., 2002; Ruffman et al., 2006; Taumoepeau & Ruffman, 2006; and Taumoepeau & Ruffman, 2008). The mental state coding scheme of the FRAME coded for: (a) desires (references to what people want or need, e.g. favourites), (b) cognitions (references to mental or cognitive processes, e.g. knowing where something is located), (c) emotions (references to feelings), (d) mood states (references to transient states of feeling which are not emotions, e.g. boredom), (e) psychological attributes (references related to personality characteristics, e.g. smart, messy), (f) use of figurative language (references to non-literal uses of mental states, e.g. dying for an ice-cream) and (g) causal talk (references to explanations for why a mental state occurred or links between mental states and events or contexts, e.g. she was sad because she couldn't find her dog). Similar to the coding of emotion words, episode transcripts generated through Turboscribe were used. For each episode transcript, a trained coder identified instances of mental state use for all the above-mentioned mental state categories. Frequency of mental state terms was tallied for each category, and the rate of mental state terms for each category for a given episode was calculated as a proportion of the total utterances made in that episode.

## Cultural consciousness

Although we did not identify any existing coding schemes for cultural content in children's television shows, aside from the coding of character ethnicity (Hamlen & Imbesi, 2020), Crisp et al. (2016) analysed the diversity of children's literature available in early childhood classrooms. Using a framework from Sims (1982), Crisp and colleagues categorized the books into *melting pot* ('presenting a color-blind view of the world and/or depicting people across the rainbow of cultural identities without acknowledging it explicitly'), *social conscience* ('written with a social agenda, intended to promote acceptance and harmony,

or at least tolerance of different groups') or *culturally conscious* ('with a primary goal of speaking to and representing the experiences of underrepresented/marginalized groups') (Crisp et al., 2016, p. 34). In the current study, we adapted this coding scheme into a global rating of 'cultural consciousness' as follows: 1 (No cultural diversity), 2 (Melting pot), 3 (Social conscience) or 4 (Culturally conscious; see Appendix S1).

The rating is intended to reflect the extent to which the media content speaks to and represents the experiences of underrepresented/marginalized/non-majority cultures. It thus reflects not just having diverse characters but also accurately reflecting the experiences and culture of these characters. Identification of 'non-majority' culture will depend on the context of each show. For example, content developed in Aotearoa New Zealand (the location of the present analyses) might include representation of indigenous Māori culture, language or characters.

## Pacing

The final dimension of the FRAME is the pacing of video content. In previous research, pace has largely been measured manually, with human observers identifying changes in scene or changes in location (Fan et al., 2021; Lillard & Peterson, 2011; McHarg & Hughes, 2021). A small number of studies have used automatic processing to identify 'scene changes' as the extent of changing visual information. Lillard et al. (2015) used Scene Detector Pro to estimate scene changes as a percentage of pixel change from frame to frame. Use of automated processing eliminates the potential for error that arises from human judgement and also may help capture aspects of changing visual information that are meaningful but not picked up by strict definitions of 'changes in scene' or 'changes in location'. For this reason, we opted to follow the methodology of Lillard et al. (2015) and coded the pacing of content using Scene Detector Pro v3 (<http://www.scene-detector.com/>). We used a 45% pixel change criterion, which identifies a scene change when more than 45% of pixels differ between frames, and represents a highly conservative threshold. We used this to calculate the pacing rate of scenes per minute (number of scenes/total minutes).

## Sample

Thirty-two television shows were selected for inclusion in the present analysis based on their popularity ranking in one of two samples. First, data from the Growing Up in New Zealand (GUINZ) study was used to identify the most popular television shows for 2-year-old children as part of a large longitudinal study of children in New Zealand (for more information about GUINZ see Morton et al. (2013); Morton et al. (2015)). As part of the study, over 6000 children have been followed since their birth in 2009–2010, with data collection points occurring every 2–4 years. When the children were 2 years old, their mothers were asked, 'Could you please name the three TV programmes [child name] watches most?' As this question was only asked if mothers reported their child watched TV, responses were available for 5538 children. Initially, the top 23 most popular shows were extracted; however, we were unable to locate online video files for one of the shows (The Go Show, initially ranked number 13 in popularity). For this reason, we excluded this show and focused on the remaining 22 shows (see Table 1).

As the above data from the GUINZ study were collected in 2012, we also recruited a sample of parents in 2024 to report on their child's most frequently watched TV and video programmes. Paid social media advertising through Meta was used to recruit parents of 2–5-year-old children living in Aotearoa New Zealand to complete an online survey about their child's TV habits. We replicated the question included in the GUINZ study and asked parents, 'Could you please name the three TV programmes your child watches the most?' Responses were received from 1043 parents. Table 1 provides the top 10 most popular

TABLE 1 List of 22 television programmes included in analysis, by sample and popularity.

| Popularity ranking | Television shows                 |                              |
|--------------------|----------------------------------|------------------------------|
|                    | Growing up in New Zealand (2012) | Contemporary (2024)          |
| 1                  | The Wiggles                      | Bluey                        |
| 2                  | Mickey Mouse Clubhouse           | Paw Patrol                   |
| 3                  | Thomas & Friends                 | Peppa Pig                    |
| 4                  | Dora the Explorer                | The Wiggles                  |
| 5                  | Hi-5                             | Gabby's Dollhouse            |
| 6                  | Bob the Builder                  | Octonauts                    |
| 7                  | SpongeBob SquarePants            | Cocomelon                    |
| 8                  | Blue's Clues                     | Mickey Mouse Funhouse        |
| 9                  | Little Einsteins                 | Daniel Tiger's Neighbourhood |
| 10                 | Chuggington                      | Spidey & Friends             |
| 11                 | The Wot Wots                     |                              |
| 12                 | Handy Manny                      |                              |
| 13                 | Sesame Street                    |                              |
| 14                 | In the Night Garden              |                              |
| 15                 | Disney Toons                     |                              |
| 16                 | Fireman Sam                      |                              |
| 17                 | Roary the Racing Car             |                              |
| 18                 | Wonder Pets                      |                              |
| 19                 | Postman Pat                      |                              |
| 20                 | Barney and Friends               |                              |
| 21                 | Tiki Tours                       |                              |
| 22                 | Bubble Guppies                   |                              |

shows, in order of popularity. Only 10 shows were selected from the 2024 sample given the time and resources required to code an hour of content from each show.

Procedure

Episode selection

For each television show included in the analysis, 60min of content was coded, +/– 10 min to ensure only full episodes were included, to ensure adequate coverage of each programme while maintaining feasibility given the number of shows and the intensity of the coding scheme. To select 60min of content per show, a research assistant generated a list of episodes from the chosen television shows and a random number generator was used to select episodes from the list. If a video file for a selected episode could not be found or was incomplete, the next closest episode (in chronological order) was selected. For shows identified through the GUINZ sample, wherever possible, episodes included were those first aired in 2012. If the show did not air episodes in 2012, episodes from the closest year prior to 2012 were included, under the assumption that episodes that aired prior to 2012 would have re-run in 2012. For shows identified through the contemporary sample, wherever possible, episodes that first aired in 2024 were selected; otherwise, those from 2023 were selected (based on a similar assumption as above). For each television show, the introduction to the show was only coded once, so that the same content was not contributing multiple times to the data.

## Coding and inter-rater reliability

A team of eight researchers and research assistants was involved in the coding process. Prior to beginning coding, the research team met to discuss the coding criteria and resolve any ambiguities in the criteria. After initial training and discussion, preliminary coding was undertaken on children's television episodes not part of the analysis sample until inter-rater agreement of at least 80% was achieved between two coders (Bajpai et al., 2015; Gwet, 2012). For each domain of educational, prosocial, antisocial and aggression, emotions, mental state talk and cultural consciousness, a lead coder scored all video content using the FRAME coding scheme, as provided in [Appendix S1](#). In each case, a second coder coded 20% of all selected episodes for the purposes of calculating inter-rater reliability (Gwet, 2012). A total of 35 episodes (25 episodes from the GUINZ sample, 10 from the contemporary sample) were chosen using a random number generator. The viewing order was also randomly generated, so that episodes from different television shows were dispersed to account for coder drift.

The only dimension that did not include an element of manual coding was pacing. To assess the reliability of Scene Detector Pro at scoring video pace, we selected 40% of the episodes across all television shows included in the analysis and processed them an additional two times at the same threshold (0.45) to compare pacing estimates across the three processing runs.

## Statistical analysis

All data analysis was completed using R statistical software.

## Inter-rater reliability

Reliability was assessed for each coding category, as well as for higher-level subtotal/total scores where appropriate. Inter-rater reliability was calculated using Krippendorff's alpha for interval variables (Hayes & Krippendorff, 2007). A number of coding categories were found to occur with low frequency (e.g. occurring in less than half of the episodes coded), and for these categories, the Brennan-Prediger coefficient was calculated to assess inter-rater reliability (Quarfoot & Levine, 2016). Additionally, Gwet's AC1 coefficient was calculated for positive and negative emotion behaviours (Quarfoot & Levine, 2016). To examine the reliability of pacing estimates, an intraclass correlation (ICC) was calculated between the pacing estimates from the three processing runs for each episode selected as part of this reliability test.

## Convergent validity

To assess the convergent validity of the FRAME coding dimensions, we correlated our high-level scores in each domain with the CSM ratings. The CSM ratings were sourced from the Common Sense Media website (<https://www.common Sense Media.org/>) and included the following ratings (among others not relevant to this study): educational value, positive messages, positive role models, violence and overall star rating. The overall star rating is intended to reflect overall quality, taking into account aspects such as meaningful character development, positive messages and diverse representations. CSM also provides a 'diverse representations' rating; however, this rating is still being rolled out across scores and at the time of analysis, only two television shows in the analysis sample had CSM diverse representations ratings. Thus, this variable was excluded from our analysis. We calculated Pearson correlation coefficients between CSM ratings and our own ratings from the FRAME on educational content, prosocial rating, antisocial rating, pace, cultural consciousness, mental state talk and emotional content.

# RESULTS

## Inter-rater reliability

**Table 2** provides the results of inter-rater reliability analyses for the high-level dimension scores. Across the high-level dimensions, inter-rater reliability was acceptable, with some domains demonstrating excellent reliability. Highly reliable aspects of the coding system were identifying instances of educational content (teaching letters or words, counting, etc.) and use of specific types of words (mental state talk and emotion words). Aspects of the coding system related to interpersonal interactions and themes/messages within the content (i.e. aggression, antisocial/prosocial content, cultural consciousness) were lower but still within the acceptable range. While previous research using Scene Detector Pro had identified some small variations in the estimates produced (Lillard et al., 2015), we found through all three runs of a subset of episodes that pacing estimates were exactly the same each time (likely because we used a newer version of the software). **Appendix S2** provides reliability coefficients for each individual coding category within the coding scheme.

## Descriptive analysis of FRAME dimensions

**Table 3** provides the descriptive statistics for the high-level dimensions of the FRAME coding system across all television shows included in the analysis (i.e. both samples). **Appendix S2** provides descriptive statistics for each individual coding category within the coding scheme. Across all dimensions, the findings suggest substantial variability across television programmes. Children's television programmes averaged a pace of 43 scenes per minute, but this ranged from 11 (*Barney*) to 81 (*Peppa Pig*). All programmes contained some educational content, but again this ranged widely from less than one instructional strategy every 3 min (*Fireman Sam*) to more than five strategies per minute (*Tiki Tour*). Overall, programmes contained more prosocial content than antisocial content. Aggressive acts occurred at a rate, on average, of once every 3 min, although the distribution of this variable was skewed, with half of the shows having a rate of less than one aggressive act every 14 min. We found that mental state talk was relatively uncommon in television for young children, averaging only 3% of all words spoken. The depiction of positive emotion behaviours occurred at a mean rate of 2.38 instances per minute, while the depiction of negative emotion behaviours was less frequent, at an average of 0.66 instances per minute.

**TABLE 2** Inter-rater reliability for FRAME dimensions.

| Domain                  | Construct                               | Reliability coefficient | 95% lower CI | 95% upper CI |
|-------------------------|-----------------------------------------|-------------------------|--------------|--------------|
| Pacing                  | Pace of visual content                  | ICC = 1.00              | 1.00         | 1.00         |
| Education               | Educational content                     | $\alpha = .96$          | 0.92         | 0.98         |
|                         | Participatory action                    | $\alpha = .97$          | 0.94         | 0.98         |
| Antisocial & Aggression | Aggression                              | $\alpha = .70$          | 0.40         | 0.91         |
|                         | Global antisocial rating                | $\alpha = .77$          | 0.62         | 0.91         |
| Prosocial               | Global prosocial rating                 | $\alpha = .70$          | 0.54         | 0.83         |
| Mental State Talk       | Proportion of mental state words        | ICC = .99               | 0.99         | 0.99         |
| Cultural Consciousness  | Global rating of cultural consciousness | $\alpha = .73$          | 0.59         | 0.86         |
| Emotion                 | Positive emotion behaviour              | AC1 = 0.80              | 0.77         | 0.83         |
|                         | Negative emotion behaviour              | AC1 = 0.85              | 0.83         | 0.87         |
|                         | Total emotion words                     | $\alpha = 1.00$         | 1.00         | 1.00         |

Abbreviations: AC1, Gwet's AC1; BP, Brennan-Prediger coefficient; ICC, intraclass correlation;  $\alpha$ , Krippendorff's alpha.

TABLE 3 Descriptive statistics for FRAME domains.

| Domain                          | Construct                                     | Mean  | SD    | Median | Range       |
|---------------------------------|-----------------------------------------------|-------|-------|--------|-------------|
| Pacing                          | Pace of visual content (scenes per minute)    | 42.81 | 19.96 | 37.65  | 11.30–80.58 |
| Education                       | Educational instructional strategy per minute | 1.61  | 1.36  | 0.89   | 0.32–5.31   |
|                                 | Participatory action (duration in minutes)    | 2.15  | 3.69  | 0.00   | 0.00–13.77  |
| Antisocial & aggressive content | Aggression frequency (rate per minute)        | 0.31  | 0.62  | 0.07   | 0.00–2.83   |
|                                 | Global antisocial rating                      | 1.55  | 0.58  | 1.33   | 1.00–3.00   |
| Prosocial content               | Global prosocial rating                       | 2.32  | 0.50  | 2.46   | 1.00–3.00   |
| Mental state talk               | Per cent mental state words                   | 2.90  | 0.76  | 2.96   | 0.01–4.13   |
| Cultural consciousness          | Global rating of cultural consciousness       | 1.87  | 0.64  | 1.87   | 1.00–3.50   |
| Emotions                        | Positive emotion behaviours (rate per minute) | 2.38  | 3.57  | 2.32   | 1.85–3.32   |
|                                 | Negative emotion behaviours (rate per minute) | 0.66  | 0.65  | 0.46   | 0.00–2.65   |
|                                 | Per cent emotion words                        | 1.34  | 0.53  | 1.27   | 0.31–2.68   |

Table 4 provides the bivariate correlations among the FRAME domains. Results indicate that certain types of content are more likely to co-occur than others. The pace of visual content was negatively correlated with our two measures of educational content ( $r = -0.38$  with educational strategies and  $r = -0.47$  with participatory action) and positively correlated with the global antisocial rating ( $r = 0.48$ ) and the frequency of aggression ( $r = 0.44$ ) and negative emotion behaviours ( $r = 0.42$ ), suggesting that fast-paced shows tend to be less educational and contain more antisocial themes and aggressive content. Television shows that rated higher in cultural consciousness also scored higher in both educational strategies ( $r = 0.48$ ) and participatory action ( $r = 0.34$ ) and contained fewer negative emotion behaviours ( $r = -0.44$ ).

## Correlation with common sense media ratings

To assess the convergent validity of the dimension scores of the FRAME, we examined correlations between our high-level dimensional scores and the CSM ratings of overall star rating, educational value, positive messages, positive role models and violence. Correlations are provided in Table 5, and Figure 2 provides a visual heat map of associations among FRAME dimensions and CSM ratings. In relation to our a priori hypotheses, convergent validity was established for FRAME prosocial ratings ( $r = 0.53$  with CSM Positive Messages and  $r = 0.44$  with CSM Positive Role Models) and FRAME aggression and anti-social ratings ( $r = 0.75$  and  $r = 0.58$  with CSM Violence, respectively). However, the correlation of  $r = 0.31$  between FRAME educational content and CSM Educational Value did not reach statistical significance.

Table 5 indicates that overall CSM Star Ratings correlate positively with the FRAME dimensions of educational strategies, global prosocial ratings and cultural consciousness ( $r = 0.35$ – $0.54$ ). CSM Violence ratings, in addition to correlating with FRAME antisocial and aggression scores, were positively correlated with pace ( $r = 0.35$ ) and rate of negative emotion behaviours ( $r = 0.42$ ). CSM Educational Value ratings, while not significantly associated with FRAME educational content, were positively correlated with prosocial ratings ( $r = 0.41$ ) and cultural consciousness ( $r = 0.48$ ) and

TABLE 4 Inter-correlations among FRAME dimensions.

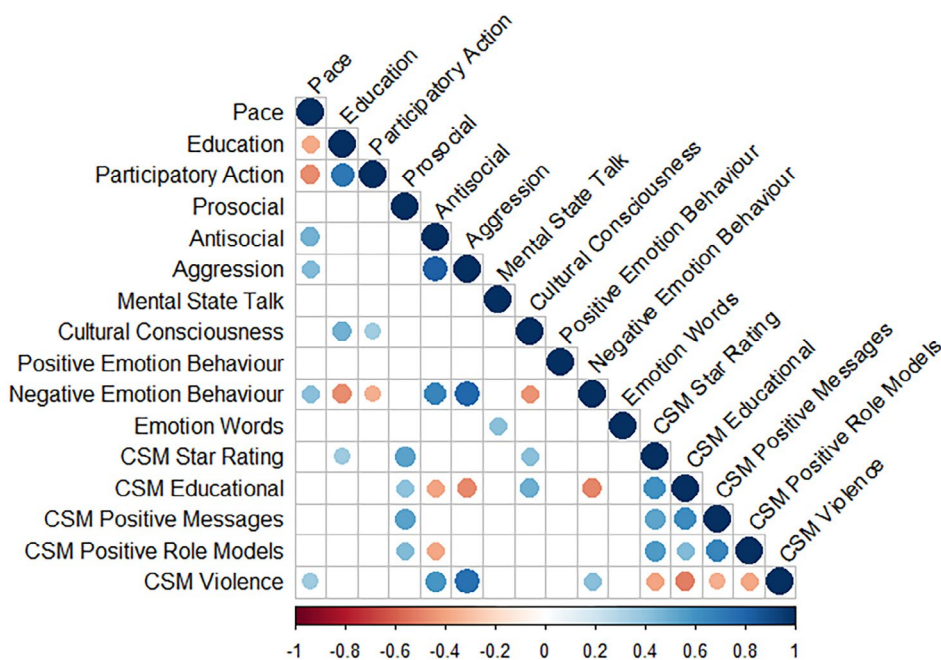
|                                 | 1       | 2       | 3      | 4     | 5       | 6       | 7     | 8      | 9    | 10   |
|---------------------------------|---------|---------|--------|-------|---------|---------|-------|--------|------|------|
| 1. Pace                         | -       |         |        |       |         |         |       |        |      |      |
| 2. Educational strategies       | -0.38*  | -       |        |       |         |         |       |        |      |      |
| 3. Participatory action         | -0.47** | 0.72*** | -      |       |         |         |       |        |      |      |
| 4. Prosocial rating             | 0.24    | -0.18   | -0.31  | -     |         |         |       |        |      |      |
| 5. Antisocial rating            | 0.48**  | -0.29   | -0.17  | 0.12  | -       |         |       |        |      |      |
| 6. Aggression                   | 0.44*   | -0.33   | -0.23  | -0.05 | 0.82*   | -       |       |        |      |      |
| 7. Mental state talk            | -0.13   | 0.16    | 0.19   | 0.13  | -0.20   | -0.04   | -     |        |      |      |
| 8. Cultural consciousness       | -0.23   | 0.48**  | 0.34*  | 0.15  | -0.16   | -0.16   | 0.06  | -      |      |      |
| 9. Positive emotion behaviours  | 0.17    | 0.05    | -0.10  | 0.00  | -0.28   | -0.16   | 0.14  | 0.08   | -    |      |
| 10. Negative emotion behaviours | 0.42*   | -0.47** | -0.36* | -0.04 | 0.65*** | 0.78*** | 0.09  | -0.44* | 0.02 | -    |
| 11. Emotion words               | 0.13    | -0.16   | -0.15  | 0.25  | -0.22   | -0.06   | 0.42* | -0.29  | 0.32 | 0.02 |

Note: \* $p < .05$ ; \*\* $p < .01$ ; \*\*\* $p < .001$ .

TABLE 5 Correlations between FRAME dimensions and common sense media ratings.

| FRAME dimension                 | Common sense media ratings <i>r</i> [95% CI] |                       |                       |                          |
|---------------------------------|----------------------------------------------|-----------------------|-----------------------|--------------------------|
|                                 | CSM star rating                              | CSM educational value | CSM positive messages | CSM positive role models |
| 1. Pace                         | -0.03 [-0.38, 0.33]                          | -0.21 [-0.54, 0.19]   | 0.10 [-0.27, 0.45]    | 0.00 [-0.38, 0.38]       |
| 2. Educational strategies       | 0.35* [0.00, 0.63]                           | 0.31 [-0.08, 0.61]    | 0.13 [-0.24, 0.47]    | 0.29 [-0.10, 0.61]       |
| 3. Participatory action         | 0.15 [-0.21, 0.49]                           | 0.14 [-0.25, 0.49]    | -0.16 [-0.49, 0.21]   | 0.26 [-0.14, 0.58]       |
| 4. Prosocial rating             | 0.54** [0.22, 0.75]                          | 0.41* [0.03, 0.68]    | 0.53** [0.21, 0.75]   | 0.44* [0.07, 0.70]       |
| 5. Antisocial rating            | -0.08 [-0.43, 0.28]                          | -0.39* [-0.67, -0.01] | -0.22 [-0.54, 0.15]   | -0.38* [-0.66, -0.00]    |
| 6. Aggression                   | -0.29 [-0.59, 0.08]                          | -0.48* [-0.73, -0.12] | -0.21 [-0.53, 0.16]   | -0.29 [-0.60, 0.10]      |
| 7. Mental state talk            | 0.24 [-0.13, 0.55]                           | -0.08 [-0.44, 0.31]   | 0.15 [-0.23, 0.48]    | 0.29 [-0.11, 0.60]       |
| 8. Cultural consciousness       | 0.42* [0.07, 0.68]                           | 0.48* [0.12, 0.73]    | 0.28 [-0.09, 0.58]    | 0.29 [-0.10, 0.60]       |
| 9. Positive emotion behaviours  | 0.08 [-0.29, 0.43]                           | -0.03 [-0.40, 0.36]   | 0.32 [-0.05, 0.61]    | 0.16 [-0.24, 0.51]       |
| 10. Negative emotion behaviours | -0.26 [-0.56, 0.12]                          | -0.48* [-0.73, -0.13] | -0.13 [-0.47, 0.25]   | -0.20 [-0.54, 0.20]      |
| 11. Emotion words               | -0.07 [-0.42, 0.30]                          | 0.02 [-0.36, 0.40]    | 0.23 [-0.14, 0.54]    | 0.10 [-0.29, 0.20]       |

Note: \**p* < .05; \*\**p* < .01; \*\*\**p* < .001.



**FIGURE 2** Correlation heat map for FRAME dimensions and common sense media ratings. CSM refers to common sense media ratings; all other scores are from the framework for rating and assessing media for early childhood.

negatively correlated with antisocial content, aggression and negative emotion behaviours ( $r = -0.39$  to  $-0.48$ ).

# DISCUSSION

Given the increasing presence of digital media in children's lives, there is a clear need for a comprehensive and systematic approach to analysing the content of children's media programming. A comprehensive and systematic framework is essential for understanding and describing children's media use, ensuring consistency across research studies and contexts, and for examining impacts of digital media on child development. In the current study, we developed a content analysis framework for assessing the features of young children's television across seven domains and applied this framework to a sample of 32 children's television shows. Our results support the usefulness and robustness of the FRAME and indicate that this type of coding framework could make a meaningful contribution to enabling consistent and comprehensive data collection within the field.

## Reliability and validity of the framework

Results of inter-rater reliability analyses indicate acceptable to high reliability across all dimensions of the framework. While the framework requires manual coding across most domains, calculating estimates of video pacing has been automated and the resulting estimates show excellent reliability and correlate largely in expected ways with other dimensions of the FRAME and with CSM ratings. The results suggest that some aspects of the coding system, such as identifying instances of educational content (teaching letters or words, counting, etc.) and use of specific types of words (mental state talk and emotion words), were very straightforward and highly reliable between multiple raters. Aspects of the coding system related to interpersonal interactions and themes/messages within the content

(i.e. aggression, antisocial/prosocial content and cultural consciousness) were more nuanced and demonstrated lower inter-rater reliability, perhaps due to differences in perception and interpretation by the raters. For instance, aggression, especially when subtle or framed as playful, was more difficult to code consistently. Despite a detailed coding scheme and extensive training, differences in how coders interpreted intent or judged behaviour as aggressive likely contributed to lower reliability in this domain. Greater consistency was achieved for the global antisocial score, suggesting this may be a more reliable indicator. However, this comes at the cost of losing detail about the specific types of aggression depicted in children's television programming.

Correlations across CSM ratings demonstrate both the validity of the FRAME dimensions and indicate what the FRAME coding system can provide above and beyond CSM ratings. Two of our hypotheses related to convergent validity were supported: CSM positive messages and CSM positive role models ratings were significantly positively associated with FRAME prosocial content scores, and CSM violence ratings were significantly positively associated with FRAME antisocial content scores and aggression frequency scores. However, we did not find support for our hypothesis that CSM educational value ratings would be significantly positively associated with FRAME educational content scores. CSM's educational value rating correlated with prosocial scores on the FRAME, but neither of the two educational scores of educational strategies and participatory action. This finding can be explained by considering the scope of the CSM educational value rating, with some of the explanations for educational value ratings including '*Kids will learn important social lessons about topics like working together and understanding each other*' and '*The series encourages preschoolers to think critically about how to navigate relatable issues like breaking a toy, and each story offers a positive example of one way to cope*' (<https://www.common sense media.org/tv-reviews/>). CSM ratings seem to largely reflect the prosocial domain of the FRAME, with four out of five CSM ratings correlating positively with global prosocial ratings on the FRAME. Thus, what the FRAME offers beyond the more general ratings provided by CSM is clear differentiation between different dimensions, with educational strategies narrowly referring to building language and academic skills, and the prosocial domain focusing on the education of social issues such as sharing and cooperating, and the emotional domain focusing on affective knowledge. This differentiation is important for describing and understanding media content, but also for examining impacts of specific content features on child outcomes.

## Quality of children's television

Our results suggest substantial variability across television programmes in terms of quality. Children's television programmes averaged a pace of 43 visual changes per minute, but this ranged from 11 (*Barney*) to 81 (*Peppa Pig*). 'Visual changes' were identified as more than 45% of pixels differing between frames, which differs from traditional conceptions of manually identified scene changes within television shows. Our measure instead reflects the extent to which children are exposed to changes in visual information, and this correlated in expected ways with other dimensions of the FRAME and showed good variability across shows. Higher-paced shows were less likely to include educational components and more likely to include aggression and antisocial themes. One explanation could be that shows aimed at older children (e.g. *SpongeBob SquarePants*, *Spidey and His Amazing Friends*) might be faster-paced and include more aggression and antisocial content, although some of the fastest-paced shows were aimed at preschool-age children (e.g. *Peppa Pig*). All programmes contained some educational content, but again this ranged widely from less than one instructional strategy every 3 min (*Fireman Sam*) to more than five strategies per minute (*Tiki Tour*). Less than half of the shows included some type of participatory action, where children were encouraged to join in an activity, such as singing, dancing or clapping. Existing research suggests that music and beat synchronization facilitate the development of preliteracy skills such as phonological awareness (Bonacina et al., 2021); thus, television shows that use participatory actions to teach other skills, including educational skills, may be more effective in supporting child learning. This will be explored in future research. Use of catchy, memorable songs may also help children to retain and use the socioemotional strategies taught within media content (e.g. Rasmussen et al., 2016).

Overall, programmes contained more prosocial content than antisocial content, with every television show coded including at least some instances of prosocial behaviour. Aggressive acts occurred at a rate, on average, of once every 3 min, although the distribution of this variable was skewed, with half of the shows having a rate of less than one aggressive act every 14 min and some shows had no aggressive acts across the hour of content coded. Given research demonstrating links between viewing antisocial and aggressive media and later aggressive behaviour (Bender et al., 2018; Coyne & Archer, 2005; Linder & Gentile, 2009; Padilla-Walker et al., 2015), it is encouraging and not too surprising that media content for young children tends to focus on prosocial rather than aggressive and antisocial content. Shows rated as more prosocial also tended to include more educational content and score higher in their cultural consciousness, indicating that these positive qualities are expected to have benefits for child development (e.g. Coyne et al., 2018; Linebarger & Walker, 2005; Padilla-Walker et al., 2015; Prot et al., 2014) tend to cluster together.

While past research has evidenced the importance of mental state talk to children's developing social capacities (Tompkins et al., 2018), research has yet to examine mental state talk within child-directed media and potential influences on development. In the present study, we coded for mental state usage within our sample of children's television shows. Results show that the rate of mental state talk was low in comparison to other domains of FRAME. These low rates may be reflective of the selected shows being targeted towards preschool-aged children, and that mental state references in media content may increase with age appropriateness in shows for older children. Future research is needed to model if mental state usage in television shows affects children's perception and understanding of mental states.

In the current work, emotion behaviours were found to be more prevalent in child media than emotion words. Given that emotions are less concrete and more abstract than early learned neutral words (e.g. 'flower'), a focus on overt emotion behaviours may be more developmentally appropriate. Still, studies have shown evidence of emotion word learning in early childhood, with children as young as 17 months beginning to use basic emotion terms such as happy, sad, scared (Ogren & Sandhofer, 2021). However, it is important to note that in the present analysis we found that variability in emotion behaviours displayed by characters beyond happiness was limited. These findings are in line with prior research related to emotion behaviours in children's media, which indicates that happiness tends to be relatively overrepresented, while other emotions are relatively underrepresented (Austin, 2024; Grady et al., 2019; Wang, 2021).

## Application of the framework

In this paper, we have described our framework for coding children's media content and applied this to children's television shows from two time periods (2012 and 2024) to establish reliability and validity, as well as to understand associations among domains of the framework. Although children's media consumption has increasingly shifted towards on-demand and online video platforms, content viewed through these platforms often consists of television programmes or programme-like formats. By focusing on the characteristics of viewed content rather than the delivery platform, the framework used in this study can be applied across a range of viewing contexts, including streaming services and video-sharing platforms such as YouTube.

The next step in our work is to examine multidimensional aspects of media content in relation to child outcomes. Through the application of the FRAME, we will examine how different types of content features interact to predict developmental outcomes. We will also explore whether types or 'diets' of media content can be identified, whereby certain content features cluster together and children who are exposed to some features (e.g. prosocial content) may be more likely to be exposed to other types of features (e.g. educational features). A multidimensional approach is required to understand these different intersections and interactions of media content features, beyond examination of a single content domain. This methods paper serves as the framework for our future work focused on the effects of media content features on child developmental outcomes.

The FRAME assesses specific content features and thus will allow for more detailed analysis of the features that predict child outcomes, compared to current options such as CSM global ratings or measures specific to a single domain. Further, the FRAME will enable the creation of highly specific information for parents, policymakers and content creators in terms of the content features to look for or to create through design. While parents can search for specific shows or movies on CSM to find how they have been rated, our future work using the FRAME will identify the features that parents can watch out for in any piece of media content that signify high-quality or poor-quality content based on evidenced links to child outcomes.

## Recommendations for researchers

It is increasingly recognized that the quality of children's screen content, rather than the quantity of screen time alone, is what matters most in shaping children's developmental outcomes. Yet, despite this shift in focus, there remains a lack of comprehensive tools to assess the diversity and complexity of content young children are exposed to. The FRAME was developed in response to this gap, offering a multidimensional coding system that captures prosocial, antisocial and aggressive, educational, emotional, cultural and pacing elements in children's television programming. We encourage research to adopt the FRAME in future studies assessing screen content quality. In our study, we used a combination of manual and automated coding. For example, pacing and emotion words were automatically calculated or identified, which reduced researcher burden and allowed more time to be allocated to other dimensions. While many elements of the FRAME still require human coding (which we acknowledge is labour intensive), the structured and systemic design of the framework streamlines the process once coding begins, increasing efficacy and consistency in coding.

As AI technologies advance, researchers may explore the potential of AI-based tools to assist with content analysis. AI coding models can substantially accelerate coding and enable analyses at a much larger scale, and recent work demonstrates promising performance for some labelling tasks. However, evidence also shows that LLM accuracy varies considerably across coding tasks (including within the same dataset), indicating that performance is highly dependent on the construct being coded and the specificity of the codebook and prompts (Pangakis & Wolken, 2024). Future iterations of AI platforms, or purpose-built machine learning models trained on annotated datasets using coding schemes such as FRAME, may offer opportunities to automate parts of the coding process. However, there is also considerable value in researchers engaging directly in the coding process. First-hand exposure to the full content and storylines of children's TV shows, not just coded dimensions, offers important context for interpreting how media content may influence children's development.

We also recommend a cross-disciplinary approach to developing and applying content analysis tools such as FRAME. In our study, each dimension of the FRAME was developed and refined by researchers with relevant subject-matter expertise. We encourage researchers conducting digital media content analysis to work collaboratively, particularly across countries, to develop and apply consistent approaches. This is increasingly important given the global distribution of children's media, where both shared and country-specific content influences young children. Finally, we recommend that researchers undertaking content analysis continue to follow best practices for establishing and ensuring the reliability of their coding system. This includes rigorous coder training, the calculation of inter-rater reliability for all dimensions, and early resolution of any discrepancies in coding.

## CONCLUSIONS

The FRAME is a comprehensive, developmentally informed framework for systematically assessing the features of child-directed media. In the present study, the FRAME was successfully

applied to 32 different television programmes representing a diverse range of the popular shows for children. Results indicate the reliability and validity of the coding framework and point to its potential usefulness in research in the field of young children's media use. The current results provide preliminary evidence of reliability, validity and usefulness of the FRAME; however, it will be important for future research to confirm these results within different samples and contexts, and to utilize the framework through application to specific research aims. In particular, it will be important for future research to evaluate the utility of the FRAME in predicting child developmental outcomes.

## AUTHOR CONTRIBUTIONS

**Cara Swit:** Conceptualization; funding acquisition; writing – review and editing; methodology; data curation. **Megan Gath:** Conceptualization; funding acquisition; writing – original draft; methodology; writing – review and editing; formal analysis; data curation. **Mia McLean:** Conceptualization; methodology; data curation; writing – review and editing. **Ying Wang:** Conceptualization; methodology; data curation; writing – review and editing. **Damian Turner:** Data curation; writing – review and editing. **Jenna Gawn:** Project administration; data curation; writing – review and editing; writing – original draft; formal analysis. **Jen Smith:** Conceptualization; methodology; writing – review and editing.

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## CONFLICT OF INTEREST STATEMENT

The authors declare no conflict of interest.

## DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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## REFERENCES

- Aley, M., & Hahn, L. (2023). Altruistic and egoistic motivations of male and female characters in common sense media television programming for children. *Sex Roles*, 89, 347–359. <https://doi.org/10.1007/s11199-023-01372-y>
- American Academy of Child and Adolescent Psychiatry. (2024). Screen time and children. [https://www.aacap.org/AACAP/Families\\_and\\_Youth/Facts\\_for\\_Families/FFF-Guide/Children-And-Watching-TV-054.aspx](https://www.aacap.org/AACAP/Families_and_Youth/Facts_for_Families/FFF-Guide/Children-And-Watching-TV-054.aspx)
- Austin, S. (2024). A content analysis on emotions presented in preschool children's television. Master's thesis, Utah State University. <https://digitalcommons.usu.edu/cgi/viewcontent.cgi?article=1154&context=etd2023>
- Bajpai, S., Bajpai, R., & Chaturvedi, H. (2015). Evaluation of inter-rater agreement and inter-rater reliability for observational data: An overview of concepts and methods. *Journal of the Indian Academy of Applied Psychology*, 41, 20–27.
- Bandura, A. (1986). *Social foundations of thought and action: A social cognitive theory*. Prentice-Hall.
- Baron-Cohen, S., Golan, O., Wheelwright, S., & Granader, Y. (2010). Emotion word comprehension from 4 to 16 years old: A developmental survey. *Frontiers in Evolutionary Neuroscience*, 2, 109. <https://doi.org/10.3389/fnevo.2010.00109>

- Barrett, L. F. (2017). The theory of constructed emotion: An active inference account of interoception and categorization. *Social Cognitive and Affective Neuroscience*, 12(11), 1833. <https://doi.org/10.1093/scan/nxx060>
- Bender, P. K., Plante, C., & Gentile, D. A. (2018). The effects of violent media content on aggression. *Current Opinion in Psychology*, 19, 104–108. <https://doi.org/10.1016/j.copsyc.2017.04.003>
- Bigler, R. S., & Liben, L. S. (2007). Developmental intergroup theory: Explaining and reducing children's social stereotyping and prejudice. *Current Directions in Psychological Science*, 16(3), 162–166.
- Bonacina, S., Huang, S., White-Schwoch, T., Krizman, J., Nicol, T., & Kraus, N. (2021). Rhythm, reading, and sound processing in the brain in preschool children. *NPJ Science of Learning*, 6(1), 20.
- Bronfenbrenner, U. (1979). *The ecology of human development: Experiments by nature and design*. Harvard University Press.
- Cameron, L., Rutland, A., Brown, R., & Douch, R. (2006). Changing children's intergroup attitudes toward refugees: Testing different models of extended contact. *Child Development*, 77(5), 1208–1219.
- Cantor, J. (2001). The media and children's fears anxieties and perceptions of danger. In D. G. Singer & J. L. Singer (Eds.), *Handbook of children and the media* (pp. 215–229). Sage.
- CDC. (2024). Screen time limits. <https://www.cdc.gov/early-care-education/php/obesity-prevention-standards/screen-time-limits.html#:~:text=Do%20not%20utilize%20media%20viewing,educational%20purposes%20or%20physical%20activity>
- Chonchaiya, W., Sirachairat, C., Vijakkhana, N., Wilaisakditipakorn, T., & Pruksananonda, C. (2015). Elevated background TV exposure over time increases behavioral scores of 18-month-old toddlers. *Acta Paediatrica*, 104(10), 1039–1046.
- Christakis, D. A., & Zimmerman, F. J. (2007). Violent television viewing during preschool is associated with antisocial behavior during school age. *Pediatrics*, 120(5), 993–999.
- Christensen, C. G. (2008). Measuring social and emotional content in educational television for children. Master's thesis, University of Illinois. [https://indigo.uic.edu/articles/thesis/Measuring\\_Social\\_and\\_Emotional\\_Content\\_in\\_Educational\\_Television\\_for\\_Children/10789085](https://indigo.uic.edu/articles/thesis/Measuring_Social_and_Emotional_Content_in_Educational_Television_for_Children/10789085)
- Christensen, C. G., & Myford, C. M. (2014). Measuring social and emotional content in children's television: An instrument development study. *Journal of Broadcasting & Electronic Media*, 58(1), 21–41. <https://doi.org/10.1080/08838151.2013.875024>
- Cole, P. M., Armstrong, L. M., & Pemberton, C. K. (2010). The role of language in the development of emotion regulation. In S. D. Calkins & M. A. Bell (Eds.), *Child development at the intersection of emotion and cognition* (pp. 59–77). American Psychological Association. <https://doi.org/10.1037/12059-004>
- Common Sense Media. (2018). Common sense media announces common sense seal Tv Honorees for Fall/Winter 2018. <https://www.common sense media.org/press-releases/common-sense-media-announces-common-sense-seal-tv-honorees-for-fallwinter-2018>
- Corkin, M. T., Peterson, E. R., Henderson, A. M. E., Waldie, K. E., Reese, E., & Morton, S. M. B. (2021). Preschool screen media exposure, executive functions and symptoms of inattention/hyperactivity. *Journal of Applied Developmental Psychology*, 73, 101237. <https://doi.org/10.1016/j.appdev.2020.101237>
- Coyne, S. M., & Archer, J. (2004). Indirect aggression in the media: A content analysis of British television programs. *Aggressive Behavior*, 30(3), 254–271. <https://doi.org/10.1002/ab.20022>
- Coyne, S. M., & Archer, J. (2005). The relationship between indirect and physical aggression on television and in real life. *Social Development*, 14(2), 324–338. <https://doi.org/10.1111/j.1467-9507.2005.00304.x>
- Coyne, S. M., Padilla-Walker, L. M., Holmgren, H. G., Davis, E. J., Collier, K. M., Memmott-Elison, M. K., & Hawkins, A. J. (2018). A meta-analysis of prosocial media on prosocial behavior, aggression, and empathic concern: A multidimensional approach. *Developmental Psychology*, 54(2), 331–347. <https://doi.org/10.1037/dev0000412>
- Crick, N. R., & Dodge, K. A. (1994). A review and reformulation of social information-processing mechanisms in children's social adjustment. *Psychological Bulletin*, 115(1), 74–101.
- Crisp, T., Knezek, S. M., Quinn, M., Bingham, G. E., Girardeau, K., & Starks, F. (2016). What's on our bookshelves? The diversity of children's literature in Early childhood classroom libraries. *Journal of Children's Literature*.
- Devine, R. T., White, N., Ensor, R., & Hughes, C. (2016). Theory of mind in middle childhood: Longitudinal associations with executive function and social competence. *Developmental Psychology*, 52, 758–771. <https://doi.org/10.1037/dev0000105>
- Dyer, J. R., Shatz, M., & Wellman, H. M. (2000). Young children's storybooks as a source of mental state information. *Cognitive Development*, 15(1), 17–37. [https://doi.org/10.1016/S0885-2014\(00\)00017-4](https://doi.org/10.1016/S0885-2014(00)00017-4)
- Eirich, R., McArthur, B. A., Anhorn, C., McGuinness, C., Christakis, D. A., & Madigan, S. (2022). Association of screen time with internalizing and externalizing behavior problems in children 12 years or younger: A systematic review and meta-analysis. *JAMA Psychiatry*, 79(5), 393–405. <https://doi.org/10.1001/jamapsychiatry.2022.0155>
- Fan, L., Zhan, M., Qing, W., Gao, T., & Wang, M. (2021). The short-term impact of animation on the executive function of children aged 4 to 7. *International Journal of Environmental Research and Public Health*, 18, 8616. <https://doi.org/10.3390/ijerp18168616>
- Farkas, C., Santelices, M. P., Vallotton, C. D., Brophy-Herb, H. E., Iglesias, M., Sieverson, C., Cuellar, M. d. P., & Álvarez, C. (2020). Children's storybooks as a source of mental state references: Comparison between books from Chile, Colombia, Scotland and USA. *Cognitive Development*, 53, 100845. <https://doi.org/10.1016/j.cogdev.2019.100845>
- Feng, G. C., & Zhu, S. (2022). Dynamics of rater differences in assessing the age appropriateness of media content: A multilevel moderated mediation analysis. *Journal of Broadcasting & Electronic Media*, 66(1), 68–88. <https://doi.org/10.1080/08838151.2021.1964502>

- Feng, Y., & Park, J. (2015). Bad seed or good seed? A content analysis of the main antagonists in Walt Disney- and studio Ghibli-animated films. *Journal of Children and Media*, 9(3), 368–385. <https://doi.org/10.1080/17482798.2015.1058279>
- Fisch, S. M. (2004). *Children's learning from educational television: Sesame street and beyond*. Lawrence Erlbaum Associates.
- Gath, M., Gillon, G., McNeill, B., & Woodward, L. (2023). Assessing the impact of screen time on children's language, educational ability, and social functioning from infancy to age 8. <https://www.msd.govt.nz/about-msd-and-our-work/publications-resources/research/assessing-the-impact-of-screen-time-on-children-s-language/index.html>
- Grady, J. S., Her, M., Moreno, G., Perez, C., & Yelinek, J. (2019). Emotions in storybooks: A comparison of storybooks that represent ethnic and racial groups in the United States. *Psychology of Popular Media Culture*, 8(3), 207–217. <https://doi.org/10.1037/ppm0000185>
- Gueron-Sela, N., & Gordon-Hacker, A. (2020). Longitudinal links between media use and focused attention through toddlerhood: A cumulative risk approach. *Frontiers in Psychology*, 11, 569222. <https://doi.org/10.3389/fpsyg.2020.569222>
- Gwet, K. (2012). *Handbook of inter-rater reliability: The definitive guide to measuring the extent of agreement among raters*. Advanced Analytics.
- Hamlen, K. R., & Imbesi, K. J. (2020). Role models in the media: A content analysis of preschool television programs in the U.S. *Journal of Children and Media*, 14(3), 302–323. <https://doi.org/10.1080/17482798.2019.1689369>
- Hayes, A. F., & Krippendorff, K. (2007). Answering the call for a standard reliability measure for coding data. *Communication Methods and Measures*, 1(1), 77–89. <https://doi.org/10.1080/19312450709336664>
- Hill, D., Ameenuddin, N., Reid Chassiakos, Y., Cross, C., Hutchinson, J., Levine, A., Boyd, R., Mendelson, R., Moreno, M., & Swanson, W. S. (2016). Media and young minds. *Pediatrics*, 138(5), e20162591. <https://doi.org/10.1542/peds.2016-2591>
- Hoemann, K., Xu, F., & Barrett, L. F. (2019). Emotion words, emotion concepts, and emotional development in children: A constructionist hypothesis. *Developmental Psychology*, 55(9), 1830–1849. <https://doi.org/10.1037/dev0000686>
- Holmgren, H. G., Stockdale, L., Shawcroft, J., Coyne, S. M., & Fraser, A. M. (2023). Toddlers and the Telly: A latent profile analysis of children's television time and content and behavioral outcomes one year later in the US. *Journal of Children and Media*, 17(3), 298–317. <https://doi.org/10.1080/17482798.2023.2195194>
- Howard Gola, A. A., Richards, M. N., Lauricella, A. R., & Calvert, S. L. (2013). Building meaningful parasocial relationships between toddlers and media characters to teach early mathematical skills. *Media Psychology*, 16(4), 390–411.
- Lauricella, A. R., Gola, A. H., & Calvert, S. L. (2011). Toddlers' learning from socially meaningful video characters. *Media Psychology*, 14, 216–232. <https://doi.org/10.1080/15213269.2011.573465>
- Li, C., Cheng, G., Sha, T., Cheng, W., & Yan, Y. (2020). The relationships between screen use and health indicators among infants, toddlers, and preschoolers: A meta-analysis and systematic review. *International Journal of Environmental Research and Public Health*, 17(19), 7324. <https://doi.org/10.3390/ijerph17197324>
- Lillard, A. S., Drell, M. B., Richey, E. M., Boguszewski, K., & Smith, E. D. (2015). Further examination of the immediate impact of television on children's executive function. *Developmental Psychology*, 51(6), 792–805. <https://doi.org/10.1037/a0039097>
- Lillard, A. S., & Peterson, J. (2011). The immediate impact of different types of television on young children's executive function. *Pediatrics*, 128(4), 644–649. <https://doi.org/10.1542/peds.2010-1919>
- Linder, J. R., & Gentile, D. A. (2009). Is the television rating system valid? Indirect, verbal, and physical aggression in programs viewed by fifth grade girls and associations with behavior. *Journal of Applied Developmental Psychology*, 30(3), 286–297. <https://doi.org/10.1016/j.appdev.2008.12.013>
- Linebarger, D. L. (2006). *The between the lions American Indian literacy initiative research component: A report prepared for the United States Department of Education*. Annenberg School for Communication, University of Pennsylvania.
- Linebarger, D. L., & Walker, D. (2005). Infants' and toddlers' television viewing and language outcomes. *American Behavioral Scientist*, 48(5), 624–645. <https://doi.org/10.1177/0002764204271505>
- Linebarger, D. N., Brey, E., Fenstermacher, S., & Barr, R. (2017). What makes preschool educational television educational? A content analysis of literacy, language-promoting, and prosocial preschool programming. In R. Barr & D. N. Linebarger (Eds.), *Media exposure during infancy and Early childhood: The effects of content and context on learning and development* (pp. 97–133). Springer International Publishing. [https://doi.org/10.1007/978-3-319-45102-2\\_7](https://doi.org/10.1007/978-3-319-45102-2_7)
- Madigan, S., Browne, D., Racine, N., Mori, C., & Tough, S. (2019). Association between screen time and children's performance on a developmental screening test. *JAMA Pediatrics*, 173, 244–250. <https://doi.org/10.1001/jamapediatrics.2018.5056>
- Mares, M. L., & Woodard, E. (2005). Positive effects of television on children's social interactions: A meta-analysis. *Media Psychology*, 7(3), 301–322.
- McHarg, G., & Hughes, C. (2021). Prosocial television and prosocial toddlers: A multi-method, longitudinal investigation. *Infant Behavior & Development*, 62, 101526. <https://doi.org/10.1016/j.infbeh.2021.101526>
- McHarg, G., Worlding, A., & Hughes, C. (2022). A novel content analysis framework for investigating young children's television diets: Results of a UK-based television content analysis. *Journal of Children and Media*, 16(1), 58–67. <https://doi.org/10.1080/17482798.2021.1908389>
- Morton, S. M., Atatoa Carr, P. E., Grant, C. C., Robinson, E. M., Bandara, D. K., Bird, A., Ivory, V. C., Kingi, T. K., Liang, R., Marks, E. J., Perese, L. M., Peterson, E. R., Pryor, J. E., Reese, E., Schmidt, J. M., Waldie, K. E., & Wall, C. (2013). Cohort profile: Growing up in New Zealand. *International Journal of Epidemiology*, 42(1), 65–75. <https://doi.org/10.1093/ije/dyr206>
- Morton, S. M., Ramke, J., Kinloch, J., Grant, C. C., Carr, P. A., Leeson, H., Lee, A. C., & Robinson, E. (2015). Growing up in New Zealand cohort alignment with all New Zealand births. *Australian and New Zealand Journal of Public Health*, 39(1), 82–87. <https://doi.org/10.1111/1753-6405.12220>

- Ogren, M., & Sandhofer, C. M. (2021). Emotion words in early childhood: A language transcript analysis. *Cognitive Development*, 60, 101122. <https://doi.org/10.1016/j.cogdev.2021.101122>
- Ogren, M., & Sandhofer, C. M. (2022). Emotion words link faces to emotional scenarios in early childhood. *Emotion*, 22(1), 167–178. <https://doi.org/10.1037/emo0001063>
- Ostrov, J. M., Murray-Close, D., Godleski, S. A., & Hart, E. J. (2013). Prospective associations between forms and functions of aggression and social and affective processes during early childhood. *Journal of Experimental Child Psychology*, 116(1), 19–36. <https://doi.org/10.1016/j.jecp.2012.12.009>
- Outhwaite, L. A., Early, E., Herodotou, C., & Van Herwegen, J. (2023). Understanding how educational maths apps can enhance learning: A content analysis and qualitative comparative analysis. *British Journal of Educational Technology*, 54(5), 1292–1313. <https://doi.org/10.1111/bjet.13339>
- Outhwaite, L. A., Faulder, M., Gulliford, A., & Pitchford, N. J. (2019). Raising early achievement in math with interactive apps: A randomized control trial. *Journal of Educational Psychology*, 111(2), 284–298. <https://doi.org/10.1037/edu0000286>
- Padilla-Walker, L. M., Coyne, S. M., Collier, K. M., & Nielson, M. G. (2015). Longitudinal relations between prosocial television content and adolescents' prosocial and aggressive behavior: The mediating role of empathic concern and self-regulation. *Developmental Psychology*, 51(9), 1317–1328. <https://doi.org/10.1037/a0039488>
- Padilla-Walker, L. M., Coyne, S. M., Fraser, A. M., & Stockdale, L. A. (2013). Is Disney the nicest place on earth? A content analysis of prosocial behavior in animated Disney films. *Journal of Communication*, 63(2), 393–412. <https://doi.org/10.1111/jcom.12022>
- Padilla-Walker, L. M., Workman, K., Calley, A., Ashby, S., Holmgren, H. G., Archibald, C., & Coyne, S. M. (2024). Longitudinal associations between parents' prosocial behavior and media use and young children's prosocial development: The mediating role of children's media use. *Infancy*, 29(2), 95–112.
- Pangakis, N., & Wolken, S. (2024). Keeping humans in the loop: Human-centered automated annotation with generative AI. *Proceedings of the International AAAI Conference on Web and Social Media*, 19, 1471–1492.
- Pasnik, S., Penuel, W. R., Llorente, C., Strother, S., & Schindel, J. (2007). *Review of research on media and young children's literacy: Report to the ready to learn initiative*. Education Development Center, Inc., and SRI International.
- Pike, J. J., & Jennings, N. A. (2005). The effects of commercials on children's perceptions of gender appropriate toy use. *Sex Roles*, 52(1), 83–91.
- Prot, S., Gentile, D. A., Anderson, C. A., Suzuki, K., Swing, E., Lim, K. M., Horiuchi, Y., Jelic, M., Krahé, B., Liuqing, W., Liao, A. K., Khoo, A., Petrescu, P. D., Sakamoto, A., Tajima, S., Toma, R. A., Warburton, W., Zhang, X., & Lam, B. C. P. (2014). Long-term relations among prosocial-media use, empathy, and prosocial behavior. *Psychological Science*, 25(2), 358–368. <https://doi.org/10.1177/0956797613503854>
- Quarfoot, D., & Levine, R. A. (2016). How robust are multirater interrater reliability indices to changes in frequency distribution? *The American Statistician*, 70(4), 373–384. <https://doi.org/10.1080/00031305.2016.1141708>
- Raising Children. (2024). Managing screen time and digital technology use: Children 3-11 years. <https://raisingchildren.net.au/preschoolers/media-technology/screen-time-healthy-screen-use/managing-screen-time-3-11-years>
- Rasmussen, E. E., Autumn, S., Colwell, M. J., Shawna, W., Narissra, P.-C., Densley, R. L., & Wright, H. (2016). Relation between active mediation, exposure to Daniel Tiger's neighborhood, and US preschoolers' social and emotional development. *Journal of Children and Media*, 10(4), 443–461. <https://doi.org/10.1080/17482798.2016.1203806>
- Rideout, V., & Robb, M. B. (2020). The common sense census: Media use by kids age zero to eight. [https://www.commonsensemedia.org/sites/default/files/research/report/2020\\_zero\\_to\\_eight\\_census\\_final\\_web.pdf](https://www.commonsensemedia.org/sites/default/files/research/report/2020_zero_to_eight_census_final_web.pdf)
- Rittle-Johnson, B., Fyfe, E. R., Hofer, K. G., & Farran, D. C. (2017). Early math trajectories: Low-income children's mathematics knowledge from ages 4 to 11. *Child Development*, 88(5), 1727–1742. <https://doi.org/10.1111/cdev.12662>
- Rivas-Drake, D., Seaton, E. K., Markstrom, C., Quintana, S., Syed, M., Lee, R. M., & Yip, T. (2014). Ethnic and racial identity in adolescence: Implications for psychosocial, academic, and health outcomes. *Child Development*, 85(1), 40–57.
- Ruffman, T., Slade, L., & Crowe, E. (2002). The relation between children's and mothers' mental state language and theory-of-mind understanding. *Child Development*, 73(3), 734–751. <https://doi.org/10.1111/1467-8624.00435>
- Ruffman, T., Slade, L., Devitt, K., & Crowe, E. (2006). What mothers say and what they do: The relation between parenting, theory of mind, language and conflict/cooperation. *British Journal of Developmental Psychology*, 24(1), 105–124. <https://doi.org/10.1348/026151005X82848>
- Shaver, P., Schwartz, J., Kirson, D., & O'Connor, C. (1987). Emotion knowledge: Further exploration of a prototype approach. *Journal of Personality and Social Psychology*, 52(6), 1061–1086. <https://doi.org/10.1037/0022-3514.52.6.1061>
- Sims, R. (1982). Shadow and substance: Afro-American Experience in Contemporary Children's Fiction. <https://eric.ed.gov/?id=ED215369>
- Smith, S. W., Smith, S. L., Pieper, K. M., Yoo, J. H., Ferris, A. L., Downs, E., & Bowden, B. (2006). Altruism on American television: Examining the amount of, and context surrounding, acts of helping and sharing. *Journal of Communication*, 56(4), 707–727. <https://doi.org/10.1111/j.1460-2466.2006.00316.x>
- Stewart, T., Duncan, S., Walker, C., Berry, S., & Schofield, G. (2019). Effects of screen time on preschool health and development. <https://msd.govt.nz/documents/about-msd-and-our-work/publications-resources/research/screen-time-on-preschoolers/children-and-families-research-fund-report-effects-of-screen-time-on-p....pdf>
- Stiglic, N., & Viner, R. M. (2019). Effects of screentime on the health and well-being of children and adolescents: A systematic review of reviews. *BMJ Open*, 9(1), e023191. <https://doi.org/10.1136/bmjopen-2018-023191>

- Sundqvist, A., Koch, F.-S., Söderberg, M., Barr, R., & Heimann, M. (2022). Qualitative and quantitative aspects of child-directed parental talk and the relation to 2-year-old's developing vocabulary. *Infancy*, 27(4), 682–699. <https://doi.org/10.1111/inf.12476>
- Symons, D. K., Peterson, C. C., Slaughter, V., Roche, J., & Doyle, E. (2005). Theory of mind and mental state discourse during book reading and story-telling tasks. *British Journal of Developmental Psychology*, 23(1), 81–102. <https://doi.org/10.1348/026151004X21080>
- Taggart, J., Eisen, S., & Lillard, A. S. (2019). The current landscape of US children's television: Violent, prosocial, educational, and fantastical content. *Journal of Children and Media*, 13(3), 276–294. <https://doi.org/10.1080/17482798.2019.1605916>
- Taumoepeau, M., & Ruffman, T. (2006). Mother and infant talk about mental states relates to desire language and emotion understanding. *Child Development*, 77(2), 465–481. <https://doi.org/10.1111/j.1467-8624.2006.00882.x>
- Taumoepeau, M., & Ruffman, T. (2008). Stepping stones to others' minds: Maternal talk relates to child mental state language and emotion understanding at 15, 24, and 33 months. *Child Development*, 79(2), 284–302. <https://doi.org/10.1111/j.1467-8624.2007.01126.x>
- Tompkins, V., Benigno, J. P., Kiger Lee, B., & Wright, B. M. (2018). The relation between parents' mental state talk and children's social understanding: A meta-analysis. *Social Development*, 27(2), 223–246. <https://doi.org/10.1111/sode.12280>
- Vandewater, E. A., & Bickham, D. S. (2004). The impact of educational television on young children's reading in the context of family stress. *Journal of Applied Developmental Psychology*, 25(6), 717–728. <https://doi.org/10.1016/j.appdev.2004.09.006>
- Wang, W. (2021). A content analysis of moral values, emotions and their links in Western children's TV shows. Master's thesis, Wake Forest University. [https://wakespace.lib.wfu.edu/bitstream/handle/10339/99381/Wang\\_wfu\\_0248M\\_11717.pdf](https://wakespace.lib.wfu.edu/bitstream/handle/10339/99381/Wang_wfu_0248M_11717.pdf)
- Ward, L. M. (2004). Wading through the stereotypes: Positive and negative associations between media use and black adolescents' conceptions of self. *Developmental Psychology*, 40(2), 284–294.
- Wellman, H. M. (2014). *Making minds: How theory of mind develops*. Oxford University Press.
- Wilkinson, C., Low, F., & Gluckman, P. (2021). Screen time: The effect on children's emotional, social, and cognitive development. Koi Tū: The Centre for Informed Futures. <https://informedfutures.org/wp-content/uploads/pdf/Screen-time-The-effects-on-childrens-emotional-social-cognitive-development.pdf>
- Wright, J. C., Huston, A. C., Murphy, K. C., St. Peters, M., Pinon, M., Scantlin, R., & Kotler, J. (2001). The relations of early television viewing to school readiness and vocabulary of children from low-income families: The early window project. *Child Development*, 72(5), 1347–1366.

## SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

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