



ADVANCED REVIEW

Implications of video chat use for young children's learning and social-emotional development: Learning words, taking turns, and fostering familial relationships

Aaron R. Glick^{1,2}  | Fauzia S. Saiyed^{3,4} | Katia Kutlesa³  |
Kristine H. Onishi^{2,3} | Aparna S. Nadig^{1,2} 

¹School of Communication Sciences and Disorders, McGill University, Montreal, Quebec, Canada

²Centre for Research in Brain, Language, and Music, McGill University, Montreal, Quebec, Canada

³Department of Psychology, McGill University, Montreal, Quebec, Canada

⁴Department of Education and Human Services, Lehigh University, Bethlehem, Pennsylvania, USA

Correspondence

Aparna S. Nadig, School of Communication Sciences and Disorders, McGill University, Montreal, QC, Canada.
Email: aparna.nadig@mcgill.ca

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Abstract

Parents of young children use video chat differently than other screen media, paralleling expert recommendations (e.g., American Academy of Pediatrics Council on Communications and Media, 2016), which suggest that video chat, unlike other screen media, is acceptable for use by children under 18 months. Video chat is unique among screen media in that it permits contingent (time-sensitive and content-sensitive) social interactions. Contingent social interactions take place between a child and a partner (dyadic), with objects (triadic), and with multiple others (multi-party configurations), which critically underpin development in multiple domains. First, we review how contingent social interaction may underlie video chat's advantages in two domains: for learning (specifically learning new words) and for social-emotional development (specifically taking turns and fostering familial relationships). Second, we describe constraints on video chat use and how using chat with an active adult (co-viewing) may mitigate some of its limitations. Finally, we suggest future research directions that will clarify the potential advantages and impediments to the use of video chat by young children.

This article is categorized under:

Linguistics > Language Acquisition

Psychology > Learning

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KEYWORDS

social contingency, social-emotional development, video chat, word learning, young children

1 | INTRODUCTION

Social isolation has increased during the COVID-19 pandemic and perhaps as a result, children's use of screen media has been on the rise compared to the already high levels found in 2020, when it was reported that children under 2 years of age used screen media for an average of 49 min per day (compared to the 26 min per day they spent with print media; Rideout & Robb, 2020). For example, in Canada, 87% of children (average 6 years old) increased their

screen use because of the COVID-19 pandemic (Carroll et al., 2020), while in the United States, the use of technology to connect with others also increased in children under 5 years of age (Drouin et al., 2020), in part because video calls have been crucial for remaining connected (Goldschmidt, 2020; Lam-Cassettari et al., 2020). Even before physical distancing became the norm, the use of video chat was high in some populations (as many as 37% of parents in a highly mobile urban center saying they used video chat at least once a week with their child; McClure et al., 2015), although its use may vary drastically across populations (Rideout & Robb, 2020).

Parents and grandparents prefer video chat over other means (e.g., phone calls) for staying connected and for promoting social interaction with children (Ames et al., 2010). Video chat was especially valued when in-person gathering was not possible (e.g., due to COVID-19, Lam-Cassettari et al., 2020; or due to travel, relocation following divorce, military service, or incarceration, McClure et al., 2015). Video chat permits more than one distanced family member to engage simultaneously, fostering shared family identity and allowing family to directly observe a child's development (Ames et al., 2010); in fact, many parents feel that connecting young children with distant family using video chat feels similar to in-person interactions (McClure et al., 2015). Finally, parents preferred video chat to other forms of connection because its visual information aids young children whose verbal skills may be limited (Ames et al., 2010; Ballagas et al., 2009). Parental preferences were consistent with high rates of video chat use, regardless of usage rates for other screen media by 6- to 24-month-olds, and with video chat being an explicit exception to children's screen use limits for 36% of families (McClure et al., 2015). The value accorded to video chat by caregivers of young children suggests it is an acceptable and relatively accessible platform for communicating with family, which raises questions about whether video chat supports children in other domains, such as for social development or in explicit learning contexts.

For learning and social-emotional development in children from about 1–3 years of age, video chat is different from other media (e.g., phone, Tarasuik et al., 2013; or prerecorded video, Roseberry et al., 2014; for an extensive review see McClure & Barr, 2017). What is less clear is *why* video chat is unique and in what domains it may be a particularly effective as a tool for learning and social-emotional development, especially for young children. Video chat, unlike other screen media (e.g., prerecorded video or educational games), naturally allows for *socially contingent* interactions, that is, interactions in which a person responds to the child in a timely and relevant manner while providing accurate information about the child's environment (Myers et al., 2017; Nielsen et al., 2008; Pereira et al., 2008; Roseberry et al., 2014). Other screen media may incorporate responsiveness in the form of contingency (e.g., tapping a button to make a character move on a tablet game); however, contingency during a social interaction may provide more age-appropriate opportunities for young children. More specifically, video chat, uniquely among screen media, allows for (a) dyadic social interactions between the child and another person, which, in infancy and toddlerhood rely heavily on visual cues (Myers et al., 2017), (b) triadic interactions in which both partners engage with a third object (Myers et al., 2017; Roseberry et al., 2014), and (c) multi-party interactions with multiple participants each in separate physical locations (Ames et al., 2010; Myers et al., 2018; Strouse et al., 2018).

Socially contingent interactions play a role in learning. For example, with respect to the sounds of speech, even 3-month-olds' vocalizations became more speech-like (with well-formed syllables) after 6 min of contingent (rather than randomly timed) responses from an adult (Bloom et al., 1987), 8-month-olds showed more complex and mature vocal behavior after 10 min of responses from their mother that were socially contingent (rather than yoked, that is, timed to a different child; Goldstein et al., 2003), and English-learning 9-month-olds maintained discrimination of foreign (Mandarin) speech sounds when were exposed to contingent Mandarin speakers (Kuhl et al., 2003). And with respect to word learning, 18-month-olds were more likely to correctly match a label to an object when labeling occurred immediately after the child had looked at the object (contingently) than at other times (noncontingently; Pereira et al., 2008). With respect to learning outside the domain of language, 2-year-olds were more likely to imitate a teacher's actions when the actions were temporally responsive to the child's actions than when they were not (Nielsen et al., 2008). Interactivity may also be relevant for episodic learning (e.g., search tasks; see Troseth et al., 2006), but in the current review we focus on a form of learning that should transfer across contexts: learning of words (but see Strouse & Samson, 2021, for a meta-analysis across multiple task types).

Even beyond learning contexts, socially contingent interactions also contribute to children's development. For example, social contingency may make video chat uniquely engaging for children, as children were more likely to respond to an online partner's bids (e.g., waving good-bye) when the on-screen partner's responses were contingent on the child (rather than not; Myers et al., 2017). Social contingency with a partner allows turn-taking in conversation (Casillas, 2014), and is critical for developing secure attachment, which is more likely when caregivers respond in a timely manner to their child in distressing situations (Heinicke et al., 2001).

Given that video chat is distinct from other media (McClure & Barr, 2017), the current review elaborates on why video chat is unique for learning and social-emotional development in children between 1 and 3 years of age, gathering evidence from children's (off-screen) word learning, social turn-taking, and development of familial relationships, and from research examining how to best engage children in screen media for learning (e.g., effects of media type, content characteristics, context of use; for reviews, see Kirkorian, 2018; Lauricella et al., 2017). We describe how the advantages of video chat over other screen media, for both word learning and socio-emotional development in 1- to 3-year-olds, may arise from its intrinsic capacity for contingent social interaction. We review evidence on advantages of video chat, first focusing on word learning, and then on the role of video chat in promoting social-emotional development by providing situations in which children can naturally practice turn taking while fostering family relationships. Second, we note some of video chat's limitations and their potential mitigation by the presence of an active co-viewer. Finally, we discuss avenues and recommendations for future research into the potential benefits of video chat.

2 | ADVANTAGES OF VIDEO CHAT

2.1 | For word learning

A critical aspect of learning a word is linking an arbitrary symbol (often a sound, but possibly a gesture or visual symbol) with an object, action, event, or abstract concept (Bloom, 2002; Boysson-Bardies, 2001; Hollich et al., 2000; Pereira et al., 2008; Yu & Ballard, 2007). Robust evidence shows that linking a spoken label to an object is more likely when there is contingency between the labeling event and attention to the object by the labeller (Bannard & Tomasello, 2012; Lee et al., 2015; Pereira et al., 2008; Troseth et al., 2018; Tsuji et al., 2019; Yu & Smith, 2011) or by the child learner (Myers et al., 2018; Nielsen et al., 2008; Shimpi et al., 2013). For example, 24-month-olds in an in-person interaction were more likely to correctly match a novel label with a novel object when the labeller was attentive (rather than non-attentive) to the object (Bannard & Tomasello, 2012; see Baldwin, 1993, for similar finding with 19-month-olds). In in-person interactions, 24-month-olds were also more likely to learn novel object-label pairings when the labeller reacted contingently by using the child's name, smiling at appropriate times, and pausing when the child was distracted, than when she behaved noncontingently by smiling at predetermined times and continuing even when the child was distracted (Troseth et al., 2018).

Since socially contingent interaction seems important for word learning, and since video chat allows for this type of interaction, children ought to learn novel words through video chat, which they do (for objects and object functions, Myers et al., 2017, 2018; Strouse et al., 2018; for actions, Roseberry et al., 2014). For instance, over 6 days in 1 week, 22- to 25-month-old children were exposed to a novel label for a novel object as well as an associated action (Myers et al., 2017). The teacher either interacted with the child on video chat and produced the label when the child seemed to be attending to the object (triadic socially contingent condition) or the teaching episode was presented via a pre-recorded video so that the teacher did not respond contingently to the child (noncontingent condition). When shown the novel object, children were more likely to produce the correct label (83%) and reproduce the associated action (75%) in the contingent condition than the noncontingent condition (label 62%, action 45%), consistent with children learning at a higher rate from a triadic socially contingent video chat interaction than a noncontingent video.

Parallel effects showing the advantage of video chat over noncontingent video were found for 24- to 30-month-olds presented with a novel verb ("I'm *meeping* the toy!") and a novel action on an object (Roseberry et al., 2014). In the video chat interaction, the teacher greeted the child then played a game, establishing dyadic social contingency, then, in a triadic interaction, performed a novel action on a toy. In the noncontingent situation, children watched a recorded video chat interaction with another child (yoked condition), receiving the identical information as the original participant but without the interaction being contingent on their own behavior. During test, when hearing the novel verb, children looked longer at the matching action in the video chat (67% of the time) than in the yoked condition (50%; Roseberry et al., 2014), demonstrating learning of the novel verb in the video chat condition only.

Video chat not only allows for better word learning than from other screen media (e.g., Myers et al., 2017; Roseberry et al., 2014), but also under the right circumstances, it may even be as effective as in-person interactions (Roseberry et al., 2014). For example, after exposure to a novel verb in an in-person interaction, children demonstrated similar levels of verb learning (looking to matching video 64% of time) as in the interactive video chat condition described above (67%; Roseberry et al., 2014).

Thus, perhaps because video chat, unlike other media, intrinsically enables socially contingent interactions, it readily allows children to learn new words, and to do so more effectively than from noncontingent screen media, in some cases even as effectively as from in-person situations. Here, we have focused on learning of words, but social contingency plays a role in many types of learning (e.g., seriation, i.e., placing nesting cups in order, Lauricella et al., 2011; recognition of individuals, Myers et al., 2017; and even some episodic-memory based object retrieval tasks, Troseth et al., 2006), thus we would expect that video chat may be advantageous in these situations as well (for meta-analysis on other tasks see Strouse & Samson, 2021).

2.2 | For fostering social-emotional skills

The contingent interactivity of video chat that enables effective word learning may also be critical for children to build social skills (such as turn taking) and to foster family relationships when in-person interactions are limited. Because parents' communication with their young children is scaffolded by gesturing (e.g., Zukow-Goldring, 1996); and because children's early communication focuses on the world around them and relies heavily on pointing and other gestures (Colonnese et al., 2010; Iverson & Goldin-Meadow, 2005), visual cues may often be necessary for effective communication with young children (Mundy et al., 2007; Rohlfing et al., 2012; Tomasello et al., 2007). In contrast to other screen media and in addition to being naturally contingent, video chat inherently supports co-speech gestures and other visual cues, since those who are communicating can see each other and the others' immediate environment, facilitating successful communication with young children (Ames et al., 2010; Ballagas et al., 2009; McClure et al., 2015).

2.2.1 | Turn taking

Unlike other screen media, the intrinsic interactivity of video chat means that young children can use it to maintain skills related to turn taking and coordinating a conversational rhythm (McClure et al., 2018; Strouse et al., 2018). Socially contingent coordination between conversational partners, which depends on turn taking (appropriately timing contributions and making relevant repairs during a conversation; Casillas, 2014) is believed to create a mutual rhythm of activity and inactivity that aids communication by creating a structured exchange of information (Pereira et al., 2008).

Socially contingent coordination begins early. The timing of 3-month-olds' babbling was shaped by the social contingency of their conversational partner (Bloom et al., 1987), and 2-month-olds grimace and look away less often when socially contingent dyadic interactions with their mother over video remained contingent than when they became noncontingent (Soussignan et al., 2006). Even 1-month-olds showed reduced positive affect, increased negative affect, and higher rates of looking away when faced with a suddenly unresponsive social partner (Bertin & Striano, 2006; for reviews, see Adamson & Frick, 2003; Mesman et al., 2009).

More complex social coordination develops over the first year of life. Initially, the child's conversational partner orchestrates most of the coordination (Casillas, 2014; Pereira et al., 2008), establishing the child's expectations for contingency (by 5 months, Goldstein et al., 2009). With developing motor skills, infants begin to explore their environment (Prior & Glaser, 2006), leading to more triadic interactions including objects or events (i.e., increased joint engagement and attention following via gaze following by 8–10 months, Adamson, 1995; Striano & Rochat, 1999; Tomasello et al., 2007). Children's exploration is supported by simple contingency; for instance, 12-week-olds were more likely to reach for objects when previously shown the outcome of their reaching was contingent rather than noncontingent on their reaching (Needham et al., 2014). To initiate and sustain mutual and socially contingent interactions, children must learn to follow, share, and direct the attention of their partner (Gaffan et al., 2010; Mason et al., 2019; Tomasello et al., 2007). Social coordination skills such as triadic attention (Casillas, 2014), triadic coordination (e.g., pointing to and labeling a toy of interest; Adamson et al., 2014), and language knowledge (e.g., of sentence structure, prosodic patterns) eventually dovetail with turn taking skills. For example, between the ages of 1 and 3 years, children respond to questions with increasingly shorter response latencies and linguistically more complex answers (Casillas et al., 2016); and when they are between 2 and 3 years of age they are also better able to anticipate turn changes and look at the upcoming speaker (Casillas & Frank, 2017).

Can video chat support development of turning taking skills? Taking turns in a coordinated manner depends (minimally) on dyadic socially contingent interaction (Casillas, 2014; Levinson, 2016; Zukow-Goldring, 1996), which, early in

development, relies heavily on visual cues such as facial expressions and gestures (Iverson & Goldin-Meadow, 2005; Tomasello et al., 2007), and later an ability to engage in triadic interactions involving objects or events (Mundy et al., 2007; Rohlfing et al., 2012; Tomasello et al., 2007). The dynamic and visual nature of video chat should enhance attention and support the interactivity of turn taking in a way that other screen media do not, and it seems to do so (Myers et al., 2018; Troseth et al., 2018). First, infants are more attentive to video chat than prerecorded video (at 24 and 30 months of age; Troseth et al., 2018) and respond more to video chat than to prerecorded video (from 22 to 25 months of age; Myers et al., 2017). Social contingency within an interaction can help children stay attuned to the speaker (Scofield & Behrend, 2011) which may allow children to anticipate conversational turns (Casillas et al., 2016; Levinson, 2016). Children may have difficulty maintaining social contingency without visual cues (e.g., on the phone; Ballagas et al., 2009), for example, 1.5- to 3-year-olds responded less often when the caregiver was present by telephone than when present by video chat or physically in the room (Tarasuik et al., 2013), suggesting that visual cues matter. Thus, video chat has qualities (interactivity, visual information) that would support the development of turn-taking skills in young children.

2.2.2 | Familial relationships

In addition to helping develop the social skills involved in turn taking, social contingency is also critical for forging relationships (Birnbaum et al., 2016; McClure et al., 2020; Reis et al., 2004), leading to building secure relationships with caregivers (National Scientific Council on the Developing Child, 2004; Tarasuik et al., 2011; Thompson, 2000). For example, establishing relationships through communication is fundamental for transmitting cultural and family values (Ames et al., 2010) and secure, warm family relationships support cognitive and behavioral skills (Bradley et al., 1989; Estrada et al., 1987; National Scientific Council on the Developing Child, 2004; van IJzendoorn et al., 1995). Establishing trusting relationships with carers is the basis for developing and maintaining healthy social relationships throughout the lifespan (Sakai, 2010), whereas repeated attachment and detachment or prolonged separation from important figures can be emotionally distressing for a child (National Scientific Council on the Developing Child, 2004), perhaps leading to attachment disorders (Prior & Glaser, 2006). Thus, creating trusting relationships through contingent interactions and maintaining bonds with family members even when they are physically distant is critical and can be accomplished via video chat.

Infants can distinguish between adults and build relationships to caregivers soon after birth (Field et al., 1984), which is an important first step to forming individualized relationships. Infants form foundational relationships with their caregivers (Prior & Glaser, 2006) largely through contingent dyadic social interactions (McClure et al., 2020). For example, 6- to 12-month-olds responded differently to a hide-and-seek game with their mother (played in person, through video chat, or through noncontingent video) depending on their mother's global ability to respond contingently (McClure et al., 2020), a finding that paralleled an earlier demonstration that infants and young children come to expect contingency from their caregivers and expect socially contingent dyadic interactions across different media (Hains & Muir, 1996).

What is the evidence that these individual relationships can be fostered over video chat? First, children can recognize and develop bonds with individuals over video chat. In a dyadic socially contingent interaction, infants from 3 to 6 months of age showed greater positive affect toward an unfamiliar individual introduced through closed-circuit video (which functions similar to video chat) than through a noncontingent video with similar content (Hains & Muir, 1996), while 17- to 25-month-olds were more likely to recognize and to choose as a play partner, a teacher they met on-screen through 6 days of video chat interactions than through noncontingent video with similar levels of exposure (Myers et al., 2017). Second, family relationships can be maintained through regular use of video chat, even over prolonged physical separation (Ames et al., 2010). For example, when grandparents and grandchildren chatted by video regularly, children were more comfortable during the rare in-person visits, grandparents felt present in their grandchildren's lives, and families reported overall stronger connections between the child and grandparents (Ames et al., 2010). Finally, families participated in more multi-party socially contingent interactions by video chat than by phone (where interactions tended to remain dyadic), resulting in interactions that were more similar to in-person visits (Ames et al., 2010), paralleling parental claims that connecting their 6- to 24-month-olds with distant relatives by video chat seemed to replicate casual in-person interactions and thus strengthen connectedness (McClure et al., 2015).

When individualized relationships are formed in person, attachment style is critical (Waters & Cummings, 2000), and is often used to assess relationship quality (Benoit, 2004). When an adult enables a child to play and explore the

surrounding environment while providing needed reassurance and encouragement, remaining a safe haven to which the child can return when feeling distressed, the child views this adult as a secure base which results in secure attachment (Ainsworth, 1989; Bowlby, 1988; Dykas et al., 2006; Waters & Cummings, 2000). Socially contingent interaction is fundamental for forging secure relationships since caregivers must respond appropriately through perceiving, interpreting, and appropriately responding to the child's signals (Ainsworth, 1989; Bowlby, 1988; Dykas et al., 2006; Woodhouse et al., 2020). And even the perception that the caregiver has become inaccessible and unresponsive can be distressing to the child (Prior & Glaser, 2006). In fact, 2-year-old children whose mothers participated in a 24-month intervention which, among other things, trained them to be contingently responsive to their child's needs and calls for help, had more indicators of secure attachment to their mothers than children whose mothers did not participate in the intervention (Heinicke et al., 2001). Thus, social contingency can increase the probability of secure attachments with caregivers, whereas repeated detachment and prolonged separation can cause emotional distress and enduring problems (Bradley et al., 1989; Estrada et al., 1987; National Scientific Council on the Developing Child, 2004).

Fortunately, similar to in-person interactions with an attachment figure (Bradley et al., 1989; Estrada et al., 1987; National Scientific Council on the Developing Child, 2004) interactions with an attachment figure by video chat can also be warm and mutually engaging. In a separation and reunion protocol, a parent and their child were physically separated for two 5-min periods (once with video chat available and once without), then reunited after each separation (Tarasuik et al., 2011). During the separations, children under 3 years remained content for more time with video chat available than without it (65% vs. 35% of the 5-min period, respectively). Furthermore, during the reunion periods, fewer children approached their parents when video chat had been available than when it had not (6% vs. 41%, respectively; Tarasuik et al., 2011). Thus, compared to a separation with no access to the parent, after a separation with the opportunity to interact by video chat, young children were more likely to treat the attachment figure as a secure base after being reunited in person.

It seems that both contingency and visual cues available from video chat are needed to support this sense of proximity. When a parent and their 1.5- to 3-year-old child were separated (with either video chat or an audio-only phone call available), children remained content for more time with video chat than with the phone available (88% vs. 64% of the 5-min period, respectively; Tarasuik et al., 2013). Children also played significantly more and showed significantly more positive affect in the video chat rather than the audio-only condition. Together, these results suggest that children maintained greater feelings of proximity and security when video chat rather than phone contact was possible (Tarasuik et al., 2013), highlighting the critical role of visual cues over and above social contingency alone.

Relationships with primary caregivers set the stage for attachment patterns reflected in behavior across the lifespan (Ainsworth, 1989; Bowlby, 1988; Fivush & Waters, 2015), and we know that relationships depend on socially contingent reactions (Bradley et al., 1989; Woodhouse et al., 2020). Video chat allows children to continue to engage in turn taking (Ames et al., 2010) and attachment behaviors (Tarasuik et al., 2011, 2013) even at a distance, to maintain relationships from afar (Ames et al., 2010), and to develop familiarity with a partner to begin new relationships (Hains & Muir, 1996; Myers et al., 2017), suggesting that physical separation can be mitigated through interactions via video chat (Ames et al., 2010; Tarasuik et al., 2011, 2013), potentially reducing the likelihood of later emotional or behavioral difficulties. Thus, due to the availability of visual cues during socially contingent dyadic, triadic, and multi-party interactions, video chat provides benefits to young children across domains, both in learning and also for social-emotional development.

3 | LIMITATIONS OF VIDEO CHAT AND HOW TO OVERCOME (SOME OF) THEM

In spite of the strengths of video chat compared to other media, it is limited, especially compared to in-person interactions. First, the use of video chat may be hindered by extrinsic technical difficulties (e.g., unreliable internet connection, low bandwidth, poor device quality) and the *digital divide* (e.g., differential access to internet, devices, knowledge; for a review, see Scheerder et al., 2017), factors which impede access to or the quality of video chat interactions (McClure & Barr, 2017; Seuren et al., 2021). Second, even without technical issues, video has intrinsic limitations. For example, in video chat, (1) camera, not eye location determines what is visible, and camera position is harder to adjust (Moor et al., 2019); (2) as participants tend to look at their on-screen partner not the camera, eye gaze appears to differ from in-person interactions (McClure & Barr, 2017; Roseberry et al., 2014); and (3) shared physical contact and manipulation of objects is absent (McClure & Barr, 2017) all of which make it more difficult for the child to tell if their on-screen partner is attending to the same object. These limitations of video chat may explain why, in certain contexts, learning

(Troseth et al., 2018) and attachment behavior (Tarasuik et al., 2011, 2013) seems worse with video chat than in person. For example, when a novel object was labeled while out of sight, 24- to 30-month-olds correctly matched the label to the object when taught in person but not via video chat (Troseth et al., 2018).

If video is inherently impoverished, can its deficiencies be overcome? Observations of home use of video chat suggest that physically present and active co-viewers can support young children through video chat's technical difficulties (McClure & Barr, 2017). For instance, when poor internet connectivity delayed video images, co-viewers talked with the child while the connection recovered, providing social contingency (McClure et al., 2018; McClure & Barr, 2017). Although adults may often be able to overcome these interruptions (Seuren et al., 2021), breaks in conversational flow because these technical difficulties may be more of a barrier for children (Strouse et al., 2021). Of course, video chat technology is improving, but observations of home use have showed that co-viewers may reduce children's difficulties with video chat by participating in the interaction or through strategic interventions (Myers et al., 2018; Strouse et al., 2018). Co-viewers provided creative solutions to buffer the loss of physical contact and they adapted (or asked their partner to adapt) to increase alignment in gaze or object visibility, enhancing communicative effectiveness (McClure et al., 2018; McClure & Barr, 2017). However, it is not the mere presence of a co-viewer that helps; for example, 24- to 30-month-olds matched a novel label with a novel object during a video chat interaction with a socially contingent but not with a noncontingent co-viewer (Myers et al., 2018), while 30-month-olds in a challenging on-screen teaching situation where an object was not visible when labeled (it was hidden in a box), matched a novel label to the novel object with a socially contingent but not with a noncontingent co-viewer (Strouse et al., 2018).

Although in-person interactions remain the gold standard by which caregivers provide physical comfort to, engage with, and teach children, video chat—especially with an active co-viewer—may serve as a viable alternative.

4 | FUTURE DIRECTIONS AND RECOMMENDATIONS

4.1 | Future directions

Video chat's unique capacities to support dyadic, triadic, and multi-party social contingency and to provide visual cues are identified as key features that make it more effective than other screen media for word learning and social-emotional development. We raise some open questions and future directions regarding these two areas as well as suggesting how some of the limitations of video chat can be mitigated through active co-viewing.

In most word learning studies (e.g., Myers et al., 2017, 2018; Roseberry et al., 2014; Strouse et al., 2018), words were taught by teachers who were (at least initially) unfamiliar to the child. This type of interactive, ostensive teaching was shown to be more effective when the child has some familiarity with the teacher (Shimpi et al., 2013). As most parents report their child using video chat to connect with distant family members (McClure et al., 2015), a more naturalistic situation would be to include familiar teachers (e.g., grandparent), in a home setting with more potential distractions than in the lab. Given that video chat involves socially contingent interactions, lab studies may overestimate learning (due to being in a simplified relatively distraction-free environment) or underestimate the learning that is possible from video chat with highly familiar adults or family members. However, results obtained with unfamiliar adult partners remains informative for distance learning applications.

Young children may be able to use video chat to improve on cognitive tasks both on-screen and off-screen, as social contingency influences performance in a wide variety of tasks from seriation (Lauricella et al., 2011), to recognition of others (Myers et al., 2017), to word learning (Myers et al., 2017; Roseberry et al., 2014), all of which can be practiced on video chat. Though this evidence comes from task performance, it is possible that cognitive processes underlying task performance are engaged, in which case learning via video chat may even generalize to off-screen tasks. Future research on video chat's potential for learning in a wider range of domains may promote more remote learning opportunities for young children.

The unique characteristics of video chat also support practicing and improving social skills such as turn taking (Gaffan et al., 2010; Mason et al., 2019; Tomasello et al., 2007); yet turn taking is far less studied than word learning in a video chat context. Open issues include: whether children's turn-taking skills are similar in video chat and in-person interactions, elucidating the cues children use to anticipate conversational turns, and the effect of partner familiarity on turn taking over video chat. Video chat can also be used to establish and maintain relationships (Ames et al., 2010; Myers et al., 2017), but whether relationships can be sustained in the long term is still unknown. Given that prolonged separation from important figures may be emotionally damaging to young children (National Scientific Council on the

Developing Child, 2004), it would be critical to understand the quality of attachment in relationships established or primarily maintained over video chat and whether maintaining contact by video chat can mitigate the likelihood of emotional or behavioral problems.

The visual nature of video chat means that gestures and other visual cues can be used by all members of the interaction (Ames et al., 2010; Ballagas et al., 2009; McClure et al., 2015) resulting in reduced differences from in-person interactions (relative to other screen media). Yet screen media, including video chat may also impose difficulties not found in in-person interactions (e.g., timing delays, audio issues, difficulty identifying object of partner's gaze). However, these difficulties are ones with which co-viewing adults can help and since young children often use video chat with an adult present (McClure et al., 2015), may not necessarily cause problems. Although, since children often use video chat with adults present, questions about the types of co-viewer behavior (e.g., helping to overcome technical difficulties, gesturing to referents, re-engaging the child's attention) that enhance learning arise. Existing research has focused on the types of active mediation from live co-viewers watching recorded video with the child (Strouse & Troseth, 2014), but future studies could investigate the impact of active mediation from on-screen co-viewers as well. As video chat technologies change, updating our understanding to reflect the current technologies will be necessary.

4.2 | Two research recommendations when comparing video chat to other screen media

First, *when assessing media use, it is critical to measure both frequency and duration of use*. On one hand, children's use of video chat can seem low: children (aged 0–8 years) used video chat for 1 min per day (vs. 24 min per day watching TV or videos; Rideout & Robb, 2020). On the other hand, their use can seem high: A majority of children (aged 6 to 24 months) used video chat, and more than one third of them used it at least weekly (McClure et al., 2015). Thus, while duration of use may be low, video chat may be frequently used (e.g., quick weekly check-ins with the grandparents).

Second, *to interpret rates of media use, we must understand the context of use*. Rates (and duration) of media use will vary with goals and opportunity. Location of family members will affect video chat use, as parents report wishing to maintain ties with distant family members (Ames et al., 2010; McClure et al., 2015), and during the COVID-19 pandemic, when in-person meetings were discouraged, families relied on video chat to stay connected (Goldschmidt, 2020; Lam-Cassettari et al., 2020). Although the use of video chat for distance learning or other purposes by children under 3 years of age is increasing (e.g., Szente, 2020), for some (e.g., those living in remote communities), lack of technological infrastructure (e.g., see Drake et al., 2019, for a review with respect to telemedicine) may prevent all children from benefitting from the potential of video chat for connection and learning. Systematic investigation of contextual factors on media use would provide a more comprehensive understanding about when families of young children use video chat as well as potentially informing policy as to where more infrastructure support is needed to facilitate access.

5 | CONCLUSION

The current review highlights the fact that video chat alone among screen media intrinsically includes two features critical for young children to be able to learn from screens and to enable them to build and maintain relationships: social contingency and visual cues. Social contingency has been shown to support word learning (Bannard & Tomasello, 2012; Lee et al., 2015; Troseth et al., 2018; Tsuji et al., 2019) and as expected, video chat (which allows for socially contingent triadic interaction) permits children to learn new labels more effectively than does prerecorded video (Myers et al., 2017; Roseberry et al., 2014), sometimes just as well as in-person interactions (Roseberry et al., 2014). And the socially contingent interactions that include visual context (Myers et al., 2017; Roseberry et al., 2014) available through video chat contribute to effective communication situations for children (Tomasello et al., 2007), enabling children to recognize individuals (Myers et al., 2017), to maintain relationships with family members over extended periods (Ames et al., 2010), and to engage in attachment behaviors (Tarasuik et al., 2011, 2013). The visual cues available in video chat contributed to both word learning (McClure et al., 2018) and children's apparent feelings of security (McClure & Barr, 2016; Strouse et al., 2021), demonstrating that both types of information contribute to what makes video chat distinct from and helpful for children compared to other screen media. Video chat can be a valuable tool for families separated by distance due to its technological

accessibility and relative affordability (e.g., compared to international phone calls; Ames et al., 2010), where necessary infrastructure is accessible. For all of these reasons, video chat is a favored medium for parents of young children (compared to phone calls or other screen media; Ballagas et al., 2009; McClure et al., 2015).

While there are potential limitations with video chat (McClure & Barr, 2017; Moor et al., 2019; Roseberry et al., 2014) that could hinder word learning (Troseth et al., 2018) and relationship building (Tarasuik et al., 2011), an attentive co-viewer may attenuate these difficulties (McClure & Barr, 2017; Myers et al., 2018; Strouse et al., 2018).

In sum, the advantages of video chat (over other media such as prerecorded video or phone calls) for word learning and fostering social-emotional skills stem from its capacity to support social contingency in a visual context. Its relative accessibility makes it an ideal tool for families to stay connected at a distance. These unique features permit video chat to fulfill the purpose for which parents of young children consciously choose it—to stay connected to family members—while being a platform, appropriate even for children under age 3 years, which can support their development across multiple domains.

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CONFLICT OF INTEREST

The authors have declared no conflicts of interest for this article.

AUTHOR CONTRIBUTIONS

Aaron R. Glick: Conceptualization (equal); visualization (lead); writing—original draft (equal); writing—review and editing (lead). **Fauzia S. Saiyed:** Conceptualization (equal); writing—original draft (equal). **Katia Kutlesa:** Conceptualization (equal); writing—original draft (equal). **Kristine Onishi:** Conceptualization (equal); funding acquisition (supporting); supervision (equal); visualization (supporting); writing—original draft (equal); writing—review and editing (supporting). **Aparna Nadig:** Conceptualization (equal); funding acquisition (lead); supervision (equal); visualization (supporting); writing—original draft (equal); writing—review and editing (supporting).

DATA AVAILABILITY STATEMENT

Data sharing is not applicable to this article as no new data were created or analyzed in this study.

ORCID

Aaron R. Glick  <https://orcid.org/0000-0001-6926-7166>

Katia Kutlesa  <https://orcid.org/0000-0002-8508-3233>

Aparna S. Nadig  <https://orcid.org/0000-0003-4674-979X>

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