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The Role of Parasocial Relationships in Digital Learning: an Exploratory Case Study

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Social media has become integral to education and learning because it provides a platform for access to information and resources beyond traditional classroom settings, enabling students to expand their knowledge and skills in a more interactive and personalized manner. The relationships that are formed with on-screen characters or personas (parasocial relationships) can improve understanding of the material and engagement with media content. The current study aimed to investigate the impact of parasocial relationships on a child's learning ability and test performance. The experiment, conducted as an exploratory case study with a typically developing 10-year-old child, included a parasocial condition with prior exposure to personal TikTok content of some educational video creators and other creators presented as novel (control); control conditions were further split into visible and non-visible video presenters. Performance was assessed using tests specialized by the subject and knowledge category, and an interview on the parasocial relationship was administered. The findings demonstrate that performance correlated with the presenter ratings obtained through the interview and not with the amount of previous exposure to the content created by the presenter.

Keywords: parasocial relationship, parasocial interaction, education, learning, TikTok.

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1. INTRODUCTION

Human beings often relate to onscreen media characters and form a one-sided relationship. The terms "parasocial relationship" (PSR) and "parasocial interaction" (PSI) were coined in the 1950s by Donald Horton and Richard Wohl to characterize this phenomenon. A striking example of the PSR was described by Horton and Wohl (1956): in the 1950s, performance of a radio persona resulted in thousands of love letters being sent to the radio studio. It was characterized as "symptomatic of fundamental social needs in human beings that had been brought to life by these new media" (Giles, 2010, p. 445).

PSR is defined as the "emotionally tinged, one-sided relationships individuals establish with onscreen characters" (Horton & Wohl, 1956). PSI, in its turn, is defined as "the interaction, characteristically, one-sided mediated form of social interaction between the audience and media characters, non-dialectical, controlled by the performer, and not susceptible to mutual development" (Horton & Wohl, 1956). The relationship is classified as PSR and not PSI when the interaction of media persona happens repeatedly (Horton & Wohl, 1956). PSR occurs over time which leads to a long-term relationship between the viewer and the media character (Liebers & Schramm, 2019). There is no clear cut-off point in defining how many interactions it takes to form a PSR. PSR entails a generalized emotional and cognitive

involvement with the character that can take place outside the context of any particular media exposure (Klimmt et al., 2006). PSI, on the contrary, restricts itself by only taking place during media reception between the audience and media character. PSR transcends this and can lead to long-term relationships between the media character and the audience (Liebers & Schramm, 2019).

Most studies concerning parasocial phenomena do not draw a clear distinction between the two concepts, using the terms PSI and PSR somewhat ambiguously and sometimes interchangeably (Dibble, Hartmann & Rosaen, 2016). This conflation is not only conceptual but also methodological, leading to some assessments of PSI/PSR evaluating the parasocial phenomenon in general and not making a clear distinction between the two concepts (e.g., PSI-Scale in Rubin et al., 1985) and others addressing only a single facet of the parasocial phenomenon (Hartmann & Goldhoorn, 2011). In the present article, we follow the distinction initially made by Horton and Wahl and further researched in the above-mentioned studies.

PSR can be found of numerous contrasting types, from friendship and romantic relationships to extreme worshiping or even negative relationships (Hartmann, 2017). Viewers who are exposed to any media character can develop generalized emotions and can be cognitively involved with that media character (Klimmt et al., 2006). PSR can create powerful emotional responses (Levy, 1979). If the relationship is already built, viewers can experience emotions similar to a real-life breakup (Eyal & Cohen, 2006). The most common way to assess PSR is the use of a Parasocial Interaction Scale (Rubin et al., 1985), which provides an indicator of viewers' relationship with the on-screen character (Tukachinsky, 2010). The PSI scale includes "theoretical constructs other than PSR, such as perceived realism, affinity, and identification" (Tukachinsky, 2010, p. 76).

Studies conducted on PSI/PSR focus on self-report evaluations, determining attractive features of media figures and classifications of PSI/PSR types. PSI is understood by many as a process that leads to PSR emergence and progression, and this is why most of the studies in this field focus initially on PSI. A number of studies on PSI have reported gender differences (Gleason et al., 2017; Tolbert & Drogos, 2019) in the choice of the media figure, imagined roles for those figures, and attractive traits. A certain role in PSI is played by social media engagement with personae (Bond, 2016; Tolbert & Drogos, 2019; Vonderohe, 2016). Attempts were made to determine the components of PSR, such as attachment, character personification, social realism (Brunick et al., 2016), and humanlike needs (Richards & Calvert, 2016), or explore possible mechanisms of PSR formation, such as relational maintenance through the investment model of interpersonal relationships (Eyal & Dailey, 2012).

Although one of the defining characteristics of PSR is the lack of reciprocity, multiple studies show that PSR affects various aspects of human life, such as media users' voting decisions (Centeno, 2010), political views (Wen & Cui, 2014), trust (Sherman-Morris, 2005) and even donation behavior (Lee et al., 2010). It was found that PSI/PSR can have a negative impact, including reduced self-esteem due to unrealistic body image (Eyal & Te'eni-Harari, 2013), media addiction (Grant et al., 1991), or unhealthy celebrity worship (McCutcheon et al., 2003). However, positive effects of engaging in PSI/PSR have also been discovered. Namely, PSI/PSR may yield or strengthen a sense of belonging (Derrick et al., 2009)

and aid those who experience fear of rejection (Derrick et al., 2019) or loneliness (Greenwood & Long, 2009).

Parents play an important role in PSR development of their children, and their perspective can be instrumental in understanding the phenomenon or, conversely, can illustrate a difference between parents' and children's perceptions. One of the topics being investigated from the perspective of the parent is PSR breakups. One study that included 2–8 y/o children found that boys were more likely than girls to have a favorite character of the opposite gender at a younger age. As boys and girls aged, they shifted towards favorite characters with more masculine/feminine traits, respectively, and the most commonly cited reasons for parasocial breakup were child maturation, the influence of other media characters, and habituation to the character (Bond & Calvert, 2014b). A different study states that 51% of children experienced PSR breakups (Aguiar et al., 2019) while also confirming the gender stereotyping of favorite characters. Parents' perspectives are also utilized in the creation of models and measures of PSR, such as in the study by Bond and Calvert (ibd). Parents of children (≤8 y/o) completed an online questionnaire to measure their child's PSR along three dimensions: character personification, social realism, and attachment. The measure was then utilized as the endogenous variable in a path model predicting parental perceptions. The results suggest that parent encouragement (β=.16, $p<.05$) and engagement with a replica of the character (β=.65, $p<.001$) are directly related to the strength of parents' perceptions of PSR, while repeated media exposure is indirectly related to PSR through active interactions with the character (such as talking to a character and mimicking their movements; β=.21, $p<.05$; β=.2, $p<.05$ (Bond & Calvert, 2014a).

Because PSR and PSI can augment understanding of media content and enhance users' engagement with it (Liebers & Schramm, 2019), the research into the outcomes of these interactions presents pedagogical value. Studies of multimedia learning that focus on university students found that the frontal bodily addressing style with eye contact leads to stronger PSI, and the professional dress style can be beneficial for cognitive load reduction and parasocial process enhancement (Beege et al., 2019). Although an instructor is advised against using multiple social cues simultaneously if PSI is supplemented by visual learning materials (Pi et al., 2021), gestures significantly affect retention performance, and deictic gestures, in particular, enhance attention toward the lecturer (Beege et al., 2020).

Due to the oversaturation of technology, it is inevitable that children will learn via social media and interactive programs. Previous case studies on digital learning showed that emotions play an important role and specifically, confusion and attentiveness can predict gains in device proficiency (Zhukova et al., 2020). Similar results were obtained in a study by Khalaf and colleagues (2022) when they evaluated the effects of bouts of mind-wandering as a child played various digital game-based learning applications (apps) by examining the length of relevant affective and behavioral states, iPad manipulations, and social interaction. Results demonstrated that negative emotions (boredom, distraction, confusion) if coupled with displays of attentiveness and persistence, led to positive mind-wandering and positive learning outcomes, but coupled with frustration, same displays led to the opposite effect (Khalaf et al., 2022).

PSR/PSI may also influence the learning process. Several studies report PSI/PSR leading to an increase in performance on mathematical tasks. In one study, 21-month-old toddlers learned the seriation sequencing task better from a video when a more socially meaningful character demonstrated the task (Lauricella et al., 2011). In a similar study, personalized interactive media characters were found to increase toddlers' learning of seriation skills, while toddlers with stronger PSR learn the most content from video demonstrations by the characters (Howard Gola et al., 2013). Further research into this topic utilized personalized interactive media characters and found that toddlers learned significantly more from the personalized character. Children in the personalized condition also increased in parasocial, nurturing behaviors directed at the character during play sessions, and these scores were linked to better seriation performance (Calvert et al., 2014). One explanation of the above-described increase in performance may be that familiarity with an onscreen character may also decrease the working memory load, thereby enabling toddlers to focus on processing the task being portrayed in the video (Lauricella et al., 2011).

Total daily entertainment screen use time in 8- to 12-year-olds went up from 4 hours 36 minutes in 2015 to 5 hours 33 minutes in 2021 (Rideout et al., 2022), which indicates a strong likelihood that they will develop PSR with online personalities. While research highlights that children develop PSR while viewing media content, limited research was conducted on the interaction between PSR and learning outcomes. Additionally, limited accounts that are available to date utilize quasi-experimental correlational designs, leaving the question regarding the impact of PSI and PSR on learning open. The current study aimed to address this gap in the literature. By conducting a case study of a typically developing child, we aimed to investigate the impact of PSI and PSR on learning outcomes by looking at concept comprehension, memory retention, and ability to apply learned strategies. We hypothesized that the child's learning process and outcomes would be enhanced by developing a PSR with an educator whose lessons are presented on a social media.

2. METHODS

Participant. The case subject, Ryan, is a typically developing 10-year-old Caucasian male. He began his formal education in an English-speaking preschool at the age of 18 months; he also was the subject of two case studies at the age of 28 months (Khalaf et al., 2022; Zhukova et al., 2020).

Study Design. As there is a dearth of literature on the subject of parasocial relationship in learning, exploratory case-study approach was adapted for the present study to create a blueprint of a comprehensive investigation of parasocial effect on learning and to be scaled up to larger populations. TikTok was used as the study video platform. The choice was guided by the popularity of the platform among adolescents (Xu et al., 2019). The platform includes a wide variety of content presented in short videos (usually under 30 seconds long). Studies have provided evidence that users may be motivated to use TikTok to make social connections, communicate, and as an entertaining and informational medium (Omar & Dequan, 2020). We believe these characteristics make TikTok a likely platform to be chosen

for presenting educational content to school-aged children. Additionally, TikTok is used to post both entertaining and educational videos by the same presenters. The use of TikTok enabled us to present the participant with educational video content and entertaining, "personal" content created by the same educators to facilitate the formation of PSRs. Personal videos that were presented in the parasocial condition were devoid of educational content. In the control condition, the participant only watched educational videos. For example, one of Mrs. Kelly's personal videos showed a reenactment of a scene from the movie Toy Story. It contained no educational content and simply showed her announcing "Andy's coming" to the students, followed by several scenes of students lying in random positions as the toys in the movie did when Andy arrived.

Ryan viewed videos posted on TikTok by various educators. We did not contact the content creators as the content that was used for the study is openly available. Ryan was exposed to personal and educational videos of two presenters in the parasocial condition to facilitate the formation of PSR and to only educational videos of three other presenters in two control conditions: control visible (presenter clearly visible in the material) and control non-visible (presenter is anonymous). We selected accounts presenting science and math lessons as these subject areas allowed us to test the learning component objectively by coding the child's answers as correct or incorrect. Additionally, our choice of specific creators was guided by the availability of personal and educational videos in the accounts.

For the science portion, we used two presenters from the SciShow channel (SciShow, n.d.): Savannah Geary (parasocial) and Alexis Dahl (control). Ryan watched 15 personal videos by Savannah Geary prior to starting with the educational content. The math channels used for the study included three presenters, two of whom were visible on the screen: (the_mrskelly (n.d.), presented by Mrs. Kelly (parasocial), tabwesley (n.d.), presented by Tabatha Wesley (control visible), and the third only included the teacher's voice (mathologist (n.d.), presented by an anonymous math teacher (control non-visible)) (Table 1). Most of the content presented in the videos was slightly above Ryan's grade level to ensure novelty.

After viewing the videos of the presenters in the parasocial condition, Ryan was shown the educational videos for all five presenters and then tested on the material presented in the videos to determine how well he had learned it. The difficulty level of the videos was determined based on the grade level that matched the educational concepts; however, given that the materials were not experimentally created but sourced from the videos posted on TikTok, the investigators were limited by the available content. The presented educational material was reviewed by at least two investigators to ensure comparable difficulty levels across presenters. In case of disagreements, the consensus was reached through discussions among the members of the research team. After the testing, Ryan was interviewed by a researcher using questions intended to determine his subjective feelings toward the presenters. We hypothesized that the formation of a PSR with a presenter would enhance Ryan's ability to learn from that presenter, and this would be evidenced by higher scores on tests that contained the material those presenters had taught.

The study was approved by the Institutional Review Board of the University of Houston, project identification code 16512–02 (Last renewal was received on February 8th, 2023, protocol is valid through February 7th, 2024).

Procedure. Over the course of three days, Ryan was shown a set of five personal videos by Savannah Geary (science teacher) and Mrs. Kelly (math teacher). Two researchers were virtually present during the viewing. Ryan was given the TikTok links to the videos by the researchers and allowed to watch them without further instruction at his own pace. Next, Ryan was invited to the lab for the experimental part of the study. Before presenting Ryan with the educational TikTok videos, three standardized tests were administered to assess his knowledge of math, science, and English (to ensure he was able to communicate in this language) and his cognitive ability.

After this, Ryan was shown a set of five science videos per educator presented by a familiar educator (Savannah Geary) and a novel educator (Alexis Dahl). Ryan was instructed to watch the videos and take notes about their content that he could later use during the test. The order of videos was randomized between the familiar and unfamiliar educators. Topics covered in the videos were the environment, nature, and animals. Although the topics presented by different educators were not identical, they were of a comparable difficulty level. The exact match of topics was constrained by ecological validity of the study. The video materials were produced and posted by professional educators, making the study reflective of real-life experiences of someone who might create a parasocial bond with a TikTok educator. After viewing the videos, a test and interview were conducted.

Table 1

The overview of the educational and personal content included in the study

	Brief description	Subject	Educational videos	Personal videos	N
Savannah Geary (Channel SciShow)	A female teacher explaining curious scientific facts (e.g., animals, environment) with the aid of pictures and video materials in the background. One of the presenters for the educational channel SciShow.	Science	n = 5	✓	15
Alexis Dahl (Channel SciShow)	A female presenter describing curious scientific facts (e.g., space, animals, environment) with the aid of animations and static images on the screen. One of the presenters for the educational channel SciShow.	Science	n = 5		
Mrs. Kelly (Channel the_mrskelly)	A female teacher demonstrating simple multiplication and fraction strategies on a white board with background music.	Math	n = 3	✓	15
Tabatha Wesley (wesleytabata)	A female teacher writing mathematical expressions (e.g., isolating variables, computing percentages) on a whiteboard with on-screen comments and background music.	Math	n = 3		
Math teacher (Channel mathologist)	A disembodied voice of a teacher explaining mathematical strategies verbally (multiplication, percentages), while they're demonstrated on a screen or a sheet of paper.	Math	n = 3		

After completing the science section of the study, the same procedure was repeated for the math educators. In this section, Ryan viewed three videos on the same concept by familiar (Mrs. Kelly) and non-familiar educators (Tabatha Wesley, Mathologist). The concepts introduced in the videos included percentages, dividing fractions, and isolating the variable. Each presenter demonstrated the same concept using slightly different strategies to solve problems. While watching the videos, Ryan was encouraged to take notes. After watching each video, he was given one replication question to control the level of understanding. After watching all the videos (n=9), Ryan was administered a test containing application problems for the learned concepts. After the testing, a final interview was conducted to evaluate the parasocial component of interactions with the presenters.

Assessments. Standardized tests were used to measure Ryan's cognitive ability as well as his knowledge and skills in several academic subject areas.

Cognitive Processing Abilities

The Kaufman Assessment Battery for Children 2nd edition (KABC–II) – This test is used to assess the cognitive ability of children between the ages of 3 and 18 and is designed to give an accurate measurement regardless of the child's language and culture of origin. It determines whether the child is below, above, or of average ability for their age.

Academic Performance

The Kaufman Test of Educational Achievement 3rd edition (KTEA-3; Kaufman & Kaufman, 2014). This test assesses reading comprehension, oral and written language ability, and fluency and skill in mathematics. This test gave us a baseline score for Ryan's math ability and an assurance that he could fully understand the oral and written materials used for the study.

The Woodcock-Johnson Tests of Achievement IV (WJ IV; Schrank et al., 2014) – Consisting of subject subtests, this assessment gives a measure of knowledge within the subject area tested. Ryan was tested in science, social studies, and humanities to give us a baseline score for his skill in the subject matter covered during the science portion of the experiment.

The science and math tests were designed to determine the conceptual knowledge accumulated by the participant by watching the educational videos. The post-science and math interviews sought to assess Ryan's perception of the effectiveness of the educators in explaining the material.

Science section

The science test consisted of 29 questions, including multiple choice and free response questions, drawn from the content shown in the videos. Multiple choice answers with 4 answer options were graded on a binary scale of 0 (incorrect answer) – 1 (correct answer). Free response questions were answered verbally; they were graded on a scale from 0 to 2 according to the coding rubric, which allowed for partial credit if the response was correct but incomplete.

Math section

The math test consisted of 27 free-response application questions drawn from the content shown in the videos. The answers to these questions were graded on a scale of 0 (incorrect answer) – 1 (correct answer). The participant was allowed to use any method of his choice to solve the problem.

Follow-up Interview

An interview was conducted in which the participant was asked to report his interest, prior knowledge, and understanding of the presented concepts. He was asked to rate educators and rank how helpful he found the strategies in each video and how much he liked the presentation in each video.

The PSR interview was the final stage of the in-person testing and was used to assess the participant's attitudes toward the educators. In the interview, Ryan was asked 12 main questions, some of which also contained one or more follow-up questions, such as 'Why' to a yes/no question. The questions were of three different forms: (1) yes/no questions regarding his experiences with the presenters, e.g., "Did you feel like any of the teachers talked directly to you?"; (2) open-answer questions, e.g., "If you could describe Mrs. Kelly in a couple of words, how would you be able to describe her?"; and (3) rating scale questions of 0–10, with 10 being the highest, regarding specific characteristics of the presenters, e.g., "On a scale of 0–10, how interesting was [presenter]?" The interview questionnaire was based on a study that discovered several characteristics of PSIs that contribute to a child's formation of a PSR with a media personality (Bond & Calvert, 2014a).

3. RESULTS. FORMAL ASSESSMENTS

Cognitive Processing Abilities

The Kaufman Assessment Battery for Children-2nd Edition (KABC–II) was utilized to assess Ryan's cognitive processing abilities. On the Mental Processing Index (MPI), which provides an estimation of mental processing without a focus on language abilities and word knowledge, Ryan obtained a standard score of 97, which falls within the Average range of functioning.

Academic Performance

KTEA-3 assessment yielded the following results: on measures of spelling and decoding ability, Ryan's performance fell in the Below Average range of ability. On measures of math problem-solving skills, sight word reading, and reading comprehension, Ryan performed in the Average range. On measures of reading fluency, Ryan's score fell within the High Average range of functioning.

Subtests from the Woodcock-Johnson Tests of Achievement IV (WJ IV) were also administered to assess Ryan's knowledge in the content areas of science, social studies, and humanities. His performance in these areas was equivalent to a child in the first grade, second grade, and kindergarten, respectively.

Overall performance and effect of presenter type

The data was analyzed using fixed effects multiple linear regression model, including multiple predictor variables such as subject, question category, presenter, and parasocial scores. In regards to the subject, Ryan was significantly more successful in science questions than in math questions, $z = 2.653$, $p = 0.008$.

No significant differences were found between the control and parasocial conditions in the science subject, with most correct answers being associated with the parasocial condition. In the math subject, there were significant differences between the control non-visible and parasocial conditions ($z = 2.973$, $p = 0.003$). Ryan's performance on problems associated with the parasocial condition was slightly lower than what was noted for the control visible condition, but the difference was not statistically significant ($z = –0.237$, $p = 0.8130$).

When asked to rate presenters based on how "interesting," "informational," and "cool" they are, Ryan considered the presenter for the control non-visible condition in math to be the top presenter for that subject, according to the cumulative score across all three evaluation categories. In science, the presenter with the highest cumulative score was in the parasocial condition. His perception of presenters' characteristics aligned with the percentage of correct answers given to the questions for each condition: Ryan answered 71.11% of questions for control non-visible in math and 73.33% for the parasocial condition in science correctly (Figure 1).

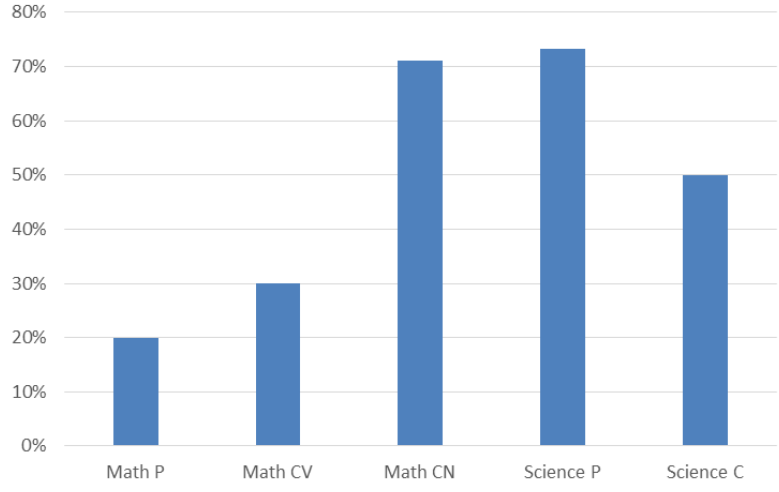

Figure 1. Percentage of correct answers per condition
(P – parasocial, C – control, CN – control non-visible CV – control visible)

Math performance

In math, subject categories were not significantly different in predicting the correctness of the responses. However, Ryan was not able to answer any questions in Isolating the Variable. His performance in Dividing Fractions and Percentages was comparable.

Most of the strategies offered in the videos were rated to be either "a bit helpful" or "very helpful." Ryan rated video presentations and strategies in the control visible condition the lowest and also happened to perform low on the tasks that were based on these videos (30% of correct answers). The presenter in the control non-visible condition got the highest scores on helpfulness and engagement. Ryan answered corresponding questions better (71.11%

of questions were answered correctly), which demonstrated an alignment between Ryan's performance and his appreciation for the videos.

Science performance

Among science questions, no significant differences were found in terms of the percentage of correct answers across categories. Most of the correct answers were found in the Animals/Environment category, then Evolution and Anatomy, with the lowest number of correct answers found in the Space category.

During the parasocial interview, Ryan indicated that he knew nothing about the topics covered in the videos for this subject. While Ryan rated both conditions (control and parasocial) equally on engagement and understanding criteria, the parasocial condition was associated with a higher percentage of correct answers (73.33% in the parasocial condition and 50% in the control condition), although the difference was not statistically significant ($z = -1.176$, $p = 0.239$).

4. DISCUSSION

The goal of the current study was to examine whether the existence of the PSR increases a child's ability to learn from educators and strengthens his performance on the corresponding tests. Because PSRs can affect a person's behavior (e.g., voting decisions; Centeno, 2010), it was our hypothesis that a PSR formed by a child with an educator via an online medium might facilitate a child's ability to learn. A qualitative assay was conducted after the experiment to evaluate Ryan's attitude to educators and their content: how interesting, engaging, and clear the information presented in the videos was for him.

While we hypothesized that the child's learning process and outcomes would be enhanced by developing a PSR with an educator, the results from the multiple regression model did not align with this hypothesis. The current literature regarding PSRs developed between children and on-screen presenters suggests that a child is more capable of learning and applying new information from presenters with whom they have formed this type of attachment (Lauricella et al., 2011; Howard Gola et al., 2013; Calvert et al., 2014). The findings of our case study did not entirely support this. Ryan's efficiency within subject areas was not uniformly slanted towards the parasocial condition: while being the condition with the correct answers in science, in math, it was associated with the lowest score within the subject area. This may be explained by the fact that it remains uncertain whether or not a PSR was formed with a presenter, as there is not a clear cut-off point in defining how many PSIs it takes to form a PSR. Even if a PSR was established, it might not have influenced the outcome. Instead, other factors contributing to performance might have had a deciding influence on the outcome, e.g., increased cognitive load from the presence of a social component to the presentation.

More specifically, toddlers tested on the association between math learning and PSRs displayed increased learning in a condition where they were able to develop a PSR with the math teacher. It was thought that such an association reduced cognitive load and allowed the toddlers to focus on the academic material (Lauricella et al., 2011). In Ryan's case, he achieved the highest math score in the control non-visible condition, the condition

in which Ryan had not been previously exposed to personal videos with the presenter, and the teacher was not even visible on the screen, although Ryan could hear his voice. This may be the condition that reduced cognitive load the most, allowing him to focus on the academic material being presented.

As for science, Ryan received the highest score under the condition in which he was expected to develop a PSR with the presenter. The discrepancy between the science and math results may be connected to Ryan's knowledge of the subject domains prior to the experiment. While Ryan achieved an average score on math problem-solving skills, he received a score equivalent to the first-grade level in science content. Our testing with Ryan occurred in the summer between his fourth and fifth-grade years of school, indicating that he was below his grade level in his scientific knowledge. In this case, it may be that the PSR developed with the science presenter is what allowed Ryan to engage with the science material and by extension, to learn it well enough to achieve a higher score on the test.

The findings were unexpected and suggested that Ryan mostly succeeded on problems that were explained by the presenters whose delivery he liked the most, regardless of whether or not an opportunity to develop PSR was present. Ryan's performance did not correlate with the presenters he was exposed to the most, suggesting that PSRs might not be a deciding factor for success in learning. This correlation does not imply causation as we cannot definitively say whether most likable presenters did help him achieve higher scores or if Ryan's assessment of presenters was a reflection of his frustration caused by the corresponding questions.

The findings of this study have to be seen in light of some limitations that can be addressed in further research. The primary limitation to the generalization of these results is that the volume of data and sample size are restricted due to the nature of the current study. External validity can be strengthened by replicating the experiment across wider populations and diversifying subject areas. The open-source materials on the topic that were available did not allow for an equal number of control conditions for both subjects. If the volume of suitable educational material keeps increasing, it will be possible to equalize the conditions of the current study, adding a control non-visible condition for the science subject.

A limitation of utilizing TikTok is that the duration of the videos–approximately 30 seconds per video– could have presented a confounding variable, as Ryan potentially did not have enough time to form a concrete PSR or learn a new concept if the topic was novel to him. As it was mentioned above, there is no general agreement on how many interactions it takes to form a PSR. Consequently, Ryan's PSR with a presenter could be weaker than if he was exposed to more of their content over an extended period of time.

The tasks differed based on the subject, being mostly multiple-choice or open-ended questions for science, but presented in the form of problems for the math subject domain. Misalignment of task presentation and effort required to solve between the two forms of assessment might have affected Ryan's performance.

The measures utilized in qualitative analysis can be improved to avoid converging variables as a result of similar ratings for most of the presenters. The findings of the present study may be used to inform future PSR experiments while standardizing a set of conditions, measures, and video materials for both subjects, as well as collecting a larger volume of data

and using videos of greater length to emphasize the effect of the PSR with the presenter. We encourage building on the present study foundation to establish a large-scale investigation of parasocial effects on learning. Developing a measure and a scale to evaluate PSI and PSR formation would be an important milestone for the field, as it will allow us to more confidently state the existence of PSR in any particular case. Future research into PSR in the context of educational content is paramount due to the widespread adoption of online educational techniques in recent years. PSR as a phenomenon is ever present, and its influence on learning needs to be accounted for in educational program design.

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Парасоциальные отношения в цифровом обучении: анализ экспериментального случая

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Социальные сети стали неотъемлемой частью образования и обучения, поскольку они предоставляют платформу для доступа к информации и ресурсам за пределами традиционного обучающего контекста, позволяя обучающимся расширять свои знания и навыки более интерактивным и персонализированным способом. Отношения, которые формируются с персонажами или персонами на экране (парасоциальные отношения), могут улучшить понимание материала и взаимодействие с медийным контентом. Цель текущего исследования заключалась в изучении влияния парасоциальных отношений на усвоение учебного материала. Анализ случая типично развивающегося 10-летнего ребенка включал в себя (1) экспериментальное условие с формированием парасоциальных отношений с помощью предварительного ознакомления с персонализированными видео образовательных Tik-Tok блогеров и (2) контрольное условие, в рамках которого участник не смотрел такие видео. Видео содержали академический контент, связанный с двумя дисциплинами: математикой и естественными науками. Контрольное условие было дополнительно разделено на два типа видео: с ведущим в кадре или только с закадровым голосом. Качество усвоения материала оценивалось с помощью тестов, специализированных по предмету и категории знаний; формирование парасоциальных отношений было проанализировано при помощи интервью. Исследование показало, что результаты тестов коррелировали с парасоциальными рейтингами блогеров, а не с объёмом взаимодействия с личными видео блогеров.

Ключевые слова: парасоциальные отношения, парасоциальное взаимодействие, образование, обучение, TikTok.

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