

# Developmental Effects of Trading Card Games (TCGs) on Children and Adolescents: A Comprehensive Analysis of Magic: The Gathering and Pokémon

## I. Executive Summary

This report provides a comprehensive and expanded analysis of the developmental effects of Trading Card Games (TCGs), specifically *Magic: The Gathering* (MTG) and *Pokémon*, on children and adolescents aged 6-16. Synthesizing empirical evidence across cognitive, social, emotional, financial, and behavioral domains, the findings reveal a complex landscape where significant benefits in executive function, strategic neural processing, and social negotiation coexist with substantial risks regarding financial gambling mechanics, potential for addiction, and sedentary behavior patterns.

Cognitively, TCGs demonstrate robust potential for enhancing working memory, planning, and cognitive flexibility, supported by neuroimaging evidence confirming activation in the prefrontal cortex (PFC), hippocampus, and striatum. Research indicates that childhood engagement with *Pokémon* can permanently alter the organization of the visual cortex, suggesting a critical period for visual pattern recognition. Socially, game stores function as vital "third places" for community building, though gendered barriers and stigmas persist. However, cultural shifts are evident, with dating trends in 2026 indicating that "nerds are sexy" and intelligence is increasingly prioritized.

Financially, the mechanics of booster packs exploit variable ratio reinforcement schedules similar to gambling, posing risks of impulsive consumption. Official statistics indicate that 1.2% of young people are experiencing problem gambling, with simulated gambling serving as a significant

gateway. The risk is highest for children with preexisting conditions such as ADHD, where comorbidity rates with gambling disorder are notably high. While the hobby can foster emotional resilience through competitive play, it also risks serving as an avoidant coping mechanism. The report concludes with recommendations for parental mediation, financial literacy education, and the importance of balancing hobby engagement with physical activity to mitigate opportunity costs.

## II. Background and Context

### Historical Evolution and Mechanics

Trading Card Games emerged as a distinct cultural and commercial phenomenon in the 1990s, blending the collection mechanics of sports cards with the strategic complexity of tabletop gaming. *Magic: The Gathering*, first published in 1993 by Wizards of the Coast, established the genre with a comprehensive framework of resource management and a "Stack" system requiring high-level executive function. *Pokémon TCG*, released in 1996, adapted the video game franchise into a card format, emphasizing elemental synergy and collectibility.

The core mechanic involves the construction of a personalized deck from a player's collection. Unlike standard board games, TCGs require "deck building," a meta-game activity where players curate a 60-card pool based on statistical probabilities and synergy. This distinction is crucial for developmental analysis, as the preparation (deck building) often engages different cognitive skills than the execution (the actual match). The complexity of these games varies significantly; *Pokémon* is often cited as an entry point due to its simpler resource system (Energy cards), whereas *Magic: The Gathering* utilizes a resource system (Mana) that requires complex probability management and foresight.

### Market Growth and Economic Scale

The TCG market has evolved into a multi-billion dollar industry. The U.S. market was valued at approximately USD 2.2 billion in 2025, while the global market was estimated at USD 7.51 billion in 2025, projected to reach USD 11.47 billion by 2031 [11, 20]. Other analyses suggest the global collectible card games market could reach USD 14.70 billion in 2026 with a CAGR of 10.98% through 2034 <sup>12</sup>. This growth is driven by strong youth adoption, particularly in the Asia-Pacific region, and the multi-generational appeal of franchises like *Pokémon*, which printed 10.2 billion cards in fiscal year 2024–25 [12, 16].

The economic model relies heavily on the "collectible" aspect, where the value of cards is driven by scarcity and competitive viability. This has led to a secondary market where single cards can sell for thousands of dollars, introducing financial literacy concepts as well as speculative risks to young participants.

**Table 1: Comparative Overview of Primary TCGs and Market Position**

Feature	Magic: The Gathering	Pokémon TCG	Yu-Gi-Oh!
<b>Target Age</b>	13+ (complexity)	6+ (accessibility)	12+
<b>Primary Mechanic</b>	Resource (Mana)	Energy Attachment & Elemental Weakness	Tribute Summoning & Life Points
<b>2025 Market Status</b>	Strongest year on record (\$1.3B revenue)	Dominant franchise (>75M cards sold)	Facing competition from One Piece TCG
<b>Cognitive Demand</b>	Extremely High (Fluid Intelligence)	Moderate-High (Literacy & Strategy)	High (Combinatorial Logic)
<b>Social Setting</b>	Game Stores, Competitive Events	Schools, Casual Play, Competitive Events	Anime-centric communities
<b>Collectibility Focus</b>	High (Reserved List, Format legality)	High (Holographic/Rare chase)	High (Rarety tiers)

### Developmental Trajectory: Age 6 vs. Age 16

The impact of TCGs is not uniform across the 6-16 age range. Developmental research highlights a statistically significant main effect of age on inhibitory control, with older children demonstrating much higher proficiency than younger children. In studies involving numerical card games, older children successfully inhibited their responses on 61% of trials, whereas younger children (around age 4-5) succeeded on only 34% of trials<sup>4</sup>. This suggests that a 16-year-old will have a substantially higher capacity for impulse control and focused attention compared to a 6-year-old, allowing for more strategic planning and adherence to complex rule sets.

Furthermore, research using the game "Concentration" highlights stark differences in memory and strategy. While 8-year-olds were found to perform just as well as adults, 6-year-olds were consistently outperformed. The developmental differences include "redundant moves" (turning over cards already seen) and fewer strategic opportunities created<sup>2</sup>. By age 16, cognitive processing in these areas is fully mature, meaning an adolescent can utilize advanced strategies and efficient memory retrieval that a 6-year-old is still developing.

## III. Core Analysis: Cognitive and Executive Function Impacts

### Neural Mechanisms and Brain Regions

Recent neuroimaging research has provided granular insight into the brain regions activated during TCG play. The prefrontal cortex (PFC) is heavily engaged during activities requiring strategy, decision-making, and self-control. Specifically, the orbitomedial prefrontal cortex (omPFC) exhibits stronger

activation during winning scenarios compared to losing, highlighting its role in processing rewards and outcomes [1, 9]. The hippocampus plays a central role in memory encoding and consolidation, engaging when players recall specific rules, card interactions, or opponent tendencies [1, 4].

The brain's reward system, including the ventral striatum and nucleus accumbens, is integral to the gaming experience. Functional MRI studies show increased activity in the ventral striatum during engaging gameplay, linked to the dopaminergic system's response to rewards [6, 9]. Crucially, the caudate nucleus—a component of the striatum—is innervated by dopaminergic pathways and is essential for modulating behavior based on rewards. Dopamine release in the caudate correlates with changes in reaction time and reinforcement learning, which underpins the "addictive" potential of the hobby [1, 5].

## **Empirical Evidence on Cognitive Benefits**

Research confirms that modern board and card games directly activate basic executive functions in children. A quadruple-blind randomized clinical trial involving 68 participants aged 7–12 found that games designed to activate executive functions significantly engaged the PFC, improving cognitive and behavioral flexibility as well as reasoning skills <sup>2</sup>. These functions include updating (monitoring working memory), inhibition (stopping automatic responses), and shifting (switching between mental tasks) <sup>4</sup>.

However, methodological caution is required. A review of intervention meta-analyses found that while action video game play was causally related to small improvements in cognitive skills, cross-sectional comparisons often showed large effects that were susceptible to publication bias <sup>9</sup>. This suggests that while TCGs likely offer benefits, the magnitude of these benefits in non-experimental settings may be inflated by selection bias—children who already possess high cognitive function may be more drawn to complex games like MTG.

## **Working Memory and Pattern Recognition**

Extensive childhood experience with Pokémon has been shown to influence the organization of the visual cortex. A study utilizing multi-voxel pattern analysis (MVPA) found that prolonged experience results in informative representations for Pokémon characters in expert participants, distinct from novices. This confirms that childhood is a critical period for developing sophisticated visual pattern recognition abilities, with implications for learning to read <sup>20</sup>. The study revealed that distributed VTC representations form a consistent spatial topography across the cortex in experienced individuals, suggesting that experience is a key factor in the normal development of recognition abilities <sup>1</sup>.

## **Literacy and Decoding**

Specific research on the Pokémon TCG has examined its utility in educational contexts. A study titled "The Effects Of An Intervention Using Pokemon Trading Card Game On The Decoding Abilities Of Children" investigated the relationship between word decoding instruction and gameplay. The intervention involving participants aged 9 to 13 suggested the TCG could be used to improve reading motivation and literacy skills [21, 22]. The game requires reading complex card text, often with specialized vocabulary, which acts as a "stealth" literacy tool, motivating children to decode text to gain a competitive advantage.

## Decision-Making and Strategic Thinking

*Magic: The Gathering* is recognized as a complex game requiring high-level strategic planning. Players must analyze the game board, anticipate opponent moves, and develop strategies within constraints. This process mirrors real-life problem-solving, requiring cognitive flexibility to navigate unexpected obstacles. The game has been analyzed through the lens of Daniel Kahneman's research on cognitive biases, where players must learn to recognize and avoid cognitive illusions to make rational choices [2, 11]. Mensa has ranked *Magic: The Gathering* as arguably the best game for brain training due to its demand for serious brainpower<sup>7</sup>.

**Table 2: Neural Activation and Cognitive Function in TCG Play**

Brain Region	Cognitive Function	TCG Activity Trigger	Developmental Impact
Dorsolateral PFC	Executive Control, Planning	Calculating moves, "Stack" management	Enhances working memory and strategic planning.
Orbitomedial PFC	Reward Processing	Winning a clash, resolving a combo	Reinforces positive behaviors; links effort to reward.
Hippocampus	Memory Consolidation	Recalling complex card interactions & rules	Supports long-term retention and episodic memory.
Ventral Striatum	Motivation, Reinforcement	Opening packs, executing a successful play	Drives engagement; risk of addiction via dopamine loops.
Caudate Nucleus	Habit Formation, Learning	Mastering deck mechanics, pattern recognition	Facilitates skill acquisition but can reinforce compulsive behaviors.
Ventral Temporal Cortex	Visual Recognition	Identifying Pokémon characters/Art	Develops specialized visual pattern recognition (expertise).

## IV. Comparative Analysis: Social, Emotional, and Relational Dimensions

## **Emotional Regulation and Mindfulness**

Playing card games contributes significantly to social-emotional development by fostering emotional regulation and frustration tolerance. Card games provide a safe, structured environment where children practice managing emotions like frustration and anger. Studies have documented physiological changes among regular players, including decreased heart rates, normalized breathing patterns, and reduced cortisol levels during gameplay, inducing states resembling mindfulness<sup>2</sup>.

Developmental research highlights that children participating in regular family card nights demonstrate measurable improvements in frustration tolerance. The turn-taking structure enforces crucial pauses between emotional triggers and required responses, naturally building the "stimulus-response gap" that defines emotional intelligence<sup>2</sup>. This setting allows children to learn the difficult life lesson of losing; experts note that while dealing with disappointment calmly is hard, gameplay provides an authentic context to practice these skills [5, 7].

However, the impact varies by age. Studies on preschoolers (ages 4–9) indicate that competition can have adverse effects on academic development and peer relationships, whereas cooperation promotes problem-solving and cognitive functioning<sup>6</sup>. A 6-year-old is more susceptible to the negative emotional impacts of losing or competitive pressure, which can hinder their cognitive processing during the game. In contrast, a 16-year-old typically has developed the emotional regulation and "hot" executive functions (affective decision-making) necessary to handle the competitive nature and risk/reward scenarios found in TCGs without the same degree of social or emotional disruption<sup>8</sup>.

## **Social Development and Community Building**

TCGs offer a unique social sandbox. The trading aspect forces children to engage in perspective-taking—understanding what the other person wants—and develops communication skills through articulating fair value<sup>15</sup>. Game stores and tournament venues often function as "third places." For many children, particularly those marginalized in school due to neurodivergence, these communities offer belonging.

To support youth development, stores implement structured initiatives. For example, Gamelandia hosts "Learn to Play" sessions and Pokémon Jr. Leagues<sup>30</sup>. In Los Angeles, specific "Pokémon hangs" for players aged 16 and under feature casual tournaments where staff oversee trading to ensure fairness<sup>32</sup>. The community aspect is often the most rewarding part; as one tournament organizer noted, "The best part of *Yu-Gi-Oh!* isn't the cards—it's the people... It's family"<sup>15</sup>.

## Romantic and Social Attractiveness

The cultural stigma surrounding TCGs is shifting significantly. A 2025 study in the *Mental Health Review Journal* found that while "geek shame" persists, members of the Pokémon TCG community underreported depression diagnoses due to social desirability bias, indicating a complex relationship between identity and mental health [1, 10].

However, the dating landscape in 2026 has seen a shift toward "the nerd normal." Plenty of Fish reports that intelligence is transitioning from a "nice to have" to a highly desirable quality. According to the Millennial Intimacy Forecast, 71% of respondents explicitly stated that "nerds are sexy," indicating a move away from superficial trends toward valuing personality and passion [19, 20]. Gen Z is driving a pivot toward vulnerability and "deep dating," favoring genuine interaction over curated personas, often rejecting the "know-it-all" stereotype in favor of partners who are "nerdy and awkward" <sup>21</sup>.

## Gendered Dynamics and Representation

Despite progress, barriers remain. While the gaming population is almost equally divided by gender, the stereotype of the male gamer persists, creating a barrier to entry for women who are often perceived as "backseat gamers" or intruders [31, 32]. Harassment remains a prevalent issue, forcing many women to adopt protective strategies like using male avatars <sup>37</sup>.

However, positive shifts are occurring within the games themselves. *Magic: The Gathering* is viewed as progressive in its representation, with Wizards of the Coast introducing diverse characters like the transgender Alesha and a gay, biracial couple as a frontispiece for a major product release [2, 12]. Market trends in Pokémon also reflect this; in the *Scarlet/Violet* era, cards featuring female trainers like Iono and Miriam commanded higher market values than male trainer cards, indicating a strong demand for female representation [10, 18].

**Table 3: Social and Emotional Impacts of TCG Engagement**

Dimension	Positive Impact	Risk Factor	Mitigating Evidence
Emotional Regulation	Teaches frustration tolerance; "stimulus-response gap."	Rage quitting; emotional distress from loss.	Physiological markers of reduced cortisol during play [2].
Social Belonging	"Third Place" community; mentorship opportunities.	Gatekeeping; exclusion based on skill/gender.	Stores creating youth leagues and inclusive spaces [30, 32].
Conflict	Negotiation practice;	Exploitation in trades	Structured trading

<b>Resolution</b>	perspective-taking.	(unequal value).	environments with staff oversight [32].
<b>Romantic Attractiveness</b>	"Nerd Normal" trend; intelligence valued.	Persistent "geek" stigma; social isolation.	71% of daters say "nerds are sexy" [19].
<b>Gender Inclusion</b>	Diverse character representation (MTG/Pokémon).	Harassment; "fake geek" accusations.	High market value of female representation cards [18].

## V. Implications and Impacts: Financial Literacy and Risk Factors

### Gambling Risks and Prevalence Among Youth

The structural design of TCGs incorporates mechanics that mirror gambling behaviors, specifically through randomized booster packs. This system creates artificial scarcity through rarity tiers, incentivizing repeated purchases. Official statistics from the Gambling Commission's 2025 report indicate that 1.2% of young people scored four or more on the youth-adapted problem gambling screen, categorizing them as experiencing problem gambling <sup>10</sup>.

Research has identified a strong link between "simulated gambling" and subsequent monetary gambling. A study found that 64.5% of adolescents who paid money while playing social casino games (or similar mechanics like loot boxes/packs) reported gambling for real money as a result. This contrasts sharply with only 1.3% of non-payers who made the same transition <sup>6</sup>. The risks extend beyond financial loss; gambling among children is associated with psychological distress, social difficulties, and substance use <sup>7</sup>.

Recent research has clarified the link between physical booster packs and gambling. While earlier studies suggested CCG booster packs might not be linked to problem gambling like loot boxes, a major international survey published in 2025 contradicted these findings. This study, surveying nearly 2,000 players, found that spending on physical trading card packs is positively correlated with problem gambling, though the link was stronger for loot boxes than for physical card packs [12, 14].

### ADHD, Depression, and Comorbidity

There is a strong documented association between Attention-Deficit/Hyperactivity Disorder (ADHD) and gambling disorders. Patients with neuropsychiatric disabilities, particularly ADHD and Autism Spectrum Disorder (ASD), are overrepresented among those seeking treatment for problem gaming <sup>21</sup>. In clinical settings, half of the patients with Gambling Disorder (GD) in a specialized center had co-

occurring ADHD<sup>27</sup>.

Depression and anxiety are also frequent comorbidities. Probable pathological gamblers report higher levels of state anxiety, trait anxiety, and social stress compared to non-gamblers<sup>26</sup>. The Pathways Model of Problem Gambling suggests that adolescents with high levels of coping motives (often linked to depression/anxiety) gamble as a maladaptive way to escape negative emotional states, while those with enhancement motives (linked to ADHD/impulsivity) gamble for the "high" [23, 25].

## Financial Literacy as a Protective Factor

Financial literacy is increasingly viewed as a vital defense against pathological gambling. A systematic review concluded that investing in financial education could reduce pathological gambling behaviors<sup>2</sup>. Despite this, significant gaps remain; a 2025 survey of U.S. teens revealed substantial deficiencies in financial knowledge<sup>5</sup>.

While TCGs can teach asset valuation and budgeting (buying singles vs. packs), the "gamified" nature of the hobby often exploits these very gaps. The industry uses "whales"—a small minority of players who generate over 90% of revenue—to sustain profits<sup>4</sup>. Young children often lack the developmental capacity to navigate these monetized random reward mechanisms effectively. A notable case involved a 6-year-old who spent \$16,293.10 on microtransactions, believing the money was not real<sup>8</sup>.

**Table 4: Financial and Psychological Risk Profile**

Risk Factor	Statistic/Prevalence	Mechanism	Developmental Consequence
<b>Problem Gambling</b>	1.2% of youth (DSM-IV-MR-J screen) [10]	Variable ratio reinforcement (packs)	Financial distress; social isolation.
<b>Gateway Effect</b>	64.5% of payers in simulated games move to real gambling [6]	Normalization of risk-taking	Early onset of addictive behaviors.
<b>ADHD Comorbidity</b>	50% of Gambling Disorder patients have co-occurring ADHD [27]	Dopamine reward seeking	Impulse control deficits; academic displacement.
<b>Anxiety/Depression</b>	Higher state/trait anxiety in pathological gamblers [26]	Avoidant coping	Emotional dysregulation; escapism.
<b>Financial Literacy Gap</b>	Significant deficiencies in US teens (2025) [5]	Lack of budgeting skills	Vulnerability to marketing tactics

## VI. Time Trade-offs, Opportunity Costs, and Physical Development

### Academic Performance and Sleep

Excessive engagement with gaming, including the immersive world of TCGs, is linked to weakened academic performance. A large-scale analysis of 11,875 U.S. children aged nine to 10 found that higher screen time was mildly associated with lower academic performance <sup>4</sup>. While TCGs are physical rather than digital, the time investment required for competitive play can displace homework and study.

Sleep disruption is a significant consequence. Arousing games can delay sleep onset, and excessive gaming disrupts sleep cycles, lowering concentration and mood [1, 7]. A systematic review confirms that sleep quality acts as a mediating factor between gaming disorders and executive dysfunction, such as inattention <sup>2</sup>. Surveys indicate that children are frequently surrounded by disruptors like games that impact their ability to achieve sufficient, healthy sleep <sup>8</sup>.

### Physical Activity and Sedentary Behavior

The prevailing concern regarding TCGs is the opportunity cost; time spent playing often displaces time available for physical activity. While general screen time is associated with sedentary behavior, it is worth noting that game-based physical education programs can increase enjoyment in physical activity <sup>10</sup>. However, TCGs are inherently sedentary. Unlike *Pokémon GO*, which encourages walking and has been shown to increase physical activity and psychosocial well-being in children [11, 13], physical TCGs require long periods of sitting.

### Literacy and Focus Benefits

Despite these risks, TCGs offer specific cognitive benefits that compete favorably with other leisure activities. CCGs stimulate creativity, cognition, and logical reasoning, aiding players in synthesizing knowledge <sup>22</sup>. The Multiliteracies Approach supports the use of CCGs as a viable teaching strategy that links theory with practice <sup>22</sup>. Card games act as a screen-free antidote that sparks conversation and hones cognitive abilities, complementing early literacy skills <sup>25</sup>. Fast-paced card games teach children to pay attention and respond quickly, sharpening reflexes and concentration <sup>23</sup>.

### Skill vs. Luck and Decision Making

The distinction between skill and luck is central to understanding the cognitive demands. Studies

suggest that games with a lower incidence of luck are more likely to engage executive functions effectively<sup>1</sup>. However, in contexts involving probability estimation, the perception of skill versus luck often diverges from reality. Research on gambling involvement indicates that while cognitive reflection predicts higher accuracy in estimating probabilities, frequent gambling is actually associated with lower Bayesian accuracy<sup>6</sup>. This suggests that while TCGs are skill-based, the gambling-like elements (pack opening) can distort a child's understanding of probability and skill.

**Table 5: Opportunity Cost Analysis of TCG Participation**

Domain	Potential Negative Impact	Potential Positive Impact	Net Developmental Effect
Academic Time	Displacement of homework/study time.	Engagement with complex texts; math practice.	Neutral to Positive if mediated; Negative if uncontrolled.
Physical Health	Sedentary behavior; lack of outdoor play.	Fine motor skills; social interaction (vs. isolation).	Negative regarding fitness; Positive regarding social health.
Sleep	Late-night events/tournaments disrupt circadian rhythm.	Stress relief (cortisol reduction).	Negative if time boundaries are not enforced.
Literacy	Time away from traditional reading.	Motivation to read complex card text; decoding skills.	Positive; TCGs often serve as "stealth" literacy tools.
Attention	Potential for hyperfocus (ADHD risk).	Training in sustained attention and working memory.	Positive for neurotypical children; Risk for ADHD comorbidity.

## VII. Future Outlook and Trends

### Digital Integration and Evolving Mechanics

The boundary between physical and digital TCGs is blurring with platforms like *Magic: The Gathering Arena* and *Pokémon TCG Live*. Digital versions remove the physical trading aspect (negotiation) but accelerate the gameplay loop. The "click to open" digital pack is even more frictionless than tearing foil, potentially heightening addictive potential. Konami's 2025 launch of *Yu-Gi-Oh! Cross Duel*, featuring integrated physical card scanning, exemplifies this convergence<sup>11</sup>.

This digital shift raises new methodological questions. Research into video games indicates that habitual action video game playing is associated with increased grey matter and activity in the striatum, including an increased reliance on caudate nucleus-dependent response learning strategies

- <sup>4</sup>. As TCGs become more digital, the cognitive profile of players may shift toward these video-game-associated neural patterns.

## Regulation and Cultural Shift

As awareness of loot box mechanics grows, regulatory bodies may scrutinize the randomized nature of TCG booster packs. Future research is likely to focus on mandating transparency regarding drop rates in physical products. Policymakers in countries such as Belgium, Japan, the Netherlands, the UK, and the US have either regulated or are considering regulations for loot boxes [11, 12]. The video game industry has frequently argued against these regulations by pointing out that physical CCGs, which utilize similar mechanics, are not regulated [11, 13]. In response, researchers urge policymakers to strictly enforce and update gambling regulations to address both digital and physical gambling-like products <sup>12</sup>.

Culturally, the mainstreaming of "geek culture" suggests that the stigma of card gaming will decline. The "Nerd Normal" dating trend and the high market value of diverse representation in cards indicate a broader acceptance of the hobby [19, 18]. However, the gendered barriers in digital spaces remain a concern, with female gamers often facing stigmatization as "unsolicited female intruders" <sup>1</sup>.

## Methodological Advancements

Future research must address the limitations of current studies. The majority of research relies on cross-sectional designs, which severely limits the ability to infer causal relationships. Observational studies are particularly vulnerable to confounding and selection bias <sup>9</sup>. Researchers are adopting more sophisticated statistical techniques, such as the Random Intercept Cross-Lagged Panel Model (RI-CLPM), which offers stronger causal inference by controlling for time-invariant confounds <sup>9</sup>.

Furthermore, a significant longitudinal study published in *Scientific Reports* utilized a large sample of children to estimate the impact of different screen time types on intelligence while accounting for genetic differences in cognition and socioeconomic background. The researchers found that time spent playing video games had a positive effect on intelligence, a result that contrasted with other screen time activities <sup>21</sup>. This suggests that contradictions in prior research regarding screen time and cognition are likely due to limitations in cross-sectional designs and the failure to control for genetic predispositions and socioeconomic context.

**Table 6: Future Trend Projections for TCGs**

Trend Area	Current Trajectory	Projected Impact (2026-2030)	Key Uncertainty
Digital	Hybrid play/Physical + Digital	Increased accessibility & higher engagement	Will physical cards retain popularity?

<b>Digital Integration</b>	Hybrid play (Physical + Digital Scanning)	Increased accessibility; higher addiction risk due to speed.	Will physical cards retain value?
<b>Regulation</b>	Scrutiny of loot boxes; physical packs largely unregulated.	Potential classification of booster packs as gambling in some regions.	Industry lobbying power vs. public health concern.
<b>Cultural Perception</b>	"Nerd Normal"; mainstream acceptance of geek culture.	Reduced social stigma; increased female participation.	Persistence of harassment in competitive spaces.
<b>Market Dynamics</b>	Growth driven by Asia-Pacific and nostalgia.	Market value reaching \$14B+; continued "whale" monetization.	Economic downturns impact on discretionary spending.
<b>Research Focus</b>	Cross-sectional studies; cognitive benefits.	Longitudinal causal studies; genetic confounding controls.	Funding for large-scale longitudinal TCG studies.

## VIII. Strategic Implications and Recommendations

### Summary of Findings

Trading Card Games offer a multifaceted developmental experience. They are potent tools for exercising executive function, supported by neural activation in the PFC and hippocampus. The social environments foster belonging, though gendered barriers persist. However, the economic model relies on gambling psychology, posing risks of impulsive spending, particularly for youth with ADHD or anxiety. The distinction between association and causation remains a critical methodological hurdle; while smart kids may play MTG, MTG also appears to train cognitive skills when mediated correctly.

### Recommendations for Parents and Educators

- 1. Mediated Engagement:** Parents should treat TCGs as complex hobbies requiring guidance. Engagement should be encouraged to ensure the child understands the rules and math, maximizing the cognitive benefit <sup>2</sup>. Given the developmental differences between ages 6 and 16, parents should ensure the game's complexity matches the child's inhibitory control and strategic processing abilities.
- 2. Financial Guardrails:** To teach financial literacy, parents should encourage buying specific singles (budgeting) rather than randomized booster packs (gambling). Given the 64.5% gateway risk from simulated spending, strict limits on "pack cracking" are essential <sup>6</sup>. Parents must be vigilant regarding the "whale" mechanic, where a small minority of players drive revenue through excessive spending.
- 3. Social Monitoring:** While local game stores are often positive, parents must ensure the

environment is inclusive. Given the prevalence of gender-based harassment in gaming spaces, active monitoring of social interactions is necessary [31, 37]. Parents should look for stores with "Learn to Play" programs and youth leagues that prioritize safety and mentorship.

4. **Holistic Balance:** Ensure participation does not displace physical activity or sleep. The sedentary nature of the hobby requires scheduled breaks for physical exercise to mitigate opportunity costs<sup>4</sup>. While TCGs offer literacy benefits, they should not replace traditional reading or outdoor play.
5. **Mental Health Awareness:** Parents of children with ADHD or anxiety should monitor for signs of comorbidity with gambling disorder. The high overlap between these conditions necessitates vigilance regarding "coping" vs. "enhancement" motives for play [27, 26]. Educators can use TCGs as "gamified" rewards for academic participation, but must be aware that boys often respond more positively to these competitive mechanics than girls<sup>4</sup>.

## Recommendations for Industry and Policymakers

1. **Transparency in Odds:** Manufacturers should consider publishing drop rates for booster packs to align with emerging digital standards and allow consumers to make informed financial decisions.
2. **Age-Appropriate Marketing:** Marketing strategies should avoid targeting young children with "gambling-like" excitement without clear educational context. The distinction between "collectible" and "gambling" should be clearer in product design.
3. **Support for Inclusive Spaces:** Industry support for game stores that implement harassment-free policies and youth protection programs can help mitigate the social risks identified in this report.

## Sources

<sup>1</sup> Randomized trial on the impact of card Game-Based teaching on learning and memory retention of neurological syndromes | BMC Medical Education:

<https://bmcmededuc.biomedcentral.com/articles/10.1186/s12909-025-07630-9> <sup>2</sup> Just Play Cognitive Modern Board and Card Games, It's Going to Be Good for Your Executive Functions: A Randomized Controlled Trial with Children at Risk of Social Exclusion - PMC:

<https://pmc.ncbi.nlm.nih.gov/articles/PMC10527566/> <sup>3</sup> Impact of Playing Video Games on Cognitive Domains: <https://ac-psych.org/index.php/en/download-pdf/id/475> <sup>4</sup> The Impact of Screen Time on Sleep Patterns in School-Aged Children: A Cross-Sectional Analysis - PMC:

<https://pmc.ncbi.nlm.nih.gov/articles/PMC10903530/> <sup>5</sup> Teaching Personal Finance to Teens in the Age of Online Gambling: <https://www.edweek.org/teaching-learning/teaching-personal-finance-to-teens-in-the-age-of-online-gambling/2025/04> <sup>6</sup> Adolescents Who Play and Spend Money in Simulated

Gambling Games Are at Heightened Risk of Gambling Problems - PMC:

<https://pmc.ncbi.nlm.nih.gov/articles/PMC9517771/><sup>7</sup> Mini-Symposium Pathological Choice: The Neuroscience of Gambling and: <https://cbls.bnu.edu.cn/docs/2022-12/7e6bd82b1b424b5484d0ee8ff6290f1c.pdf><sup>8</sup>

Video games and social media: Factors disrupting healthy student sleep: <https://aasm.org/video-games-and-social-media-factors-disrupting-healthy-student-sleep/><sup>9</sup> Frontiers | Just watching the game ain't enough: striatal fMRI reward responses to successes and failures in a video game during active and vicarious playing:

<https://www.frontiersin.org/journals/human-neuroscience/articles/10.3389/fnhum.2013.00278/full><sup>10</sup> Young People and Gambling 2025: Official statistics:

<https://www.gamblingcommission.gov.uk/statistics-and-research/publication/young-people-and-gambling-2025-official-statistics><sup>11</sup> Trading Card Games Market Size, Share & Forecast 2026 ...:

<https://www.gminsights.com/industry-analysis/trading-card-games-market><sup>12</sup> Collectible Card Games Market Size & Outlook, 2026-2034: <https://straitsresearch.com/report/collectible-card-games-market><sup>13</sup> Trading Card Games Market Size, Share, Analysis & Forecast:

<https://www.verifiedmarketresearch.com/product/trading-card-games-market/><sup>14</sup> The year in collectibles: Is the surge in TCG here to stay? | clct: <https://www.clct.com/sports-collectibles/memorabilia/the-year-in-collectibles-is-the-surge-in-tcg-here-to-stay><sup>15</sup> Why Do People Collect Trading Card Games Like Pokemon And Yugioh: <https://www.alibaba.com/product-insights/why-do-people-collect-trading-card-games-like-pokemon-and-yugioh.html><sup>16</sup> Trading Card Market Growth & Forecast to 2033: <https://univdatos.com/reports/trading-card-market><sup>17</sup> Trading Card Gaming Market Size, Share, Growth & Trends 2022-30:

<https://wemarketresearch.com/reports/trading-card-game-market/103><sup>18</sup> Discussion - Gender Equality in TCG Cards? | PokéBeach: <https://www.pokebeach.com/forums/threads/gender-equality-in-tcg-cards.155924/><sup>19</sup> 2026's Biggest Dating Trends Reveal Surprising Changes Singles Need to Know: <https://theeverygirl.com/new-year-dating-trends/><sup>20</sup> Smart Is Sexy: Nerds Are About to Dominate Dating Apps in 2026: <https://www.vice.com/en/article/smart-is-sexy-nerds-are-about-to-dominate-dating-apps-in-2026/><sup>21</sup> The prevalence of gaming and gambling in a child and adolescent psychiatry unit - Frida André, Anders Håkansson, Björn Axel Johansson, Emma Claesdotter-Knutsson, 2022: <https://journals.sagepub.com/doi/10.1177/22799036221104160><sup>22</sup> (PDF) Collectible Card Games as Learning Tools:

[https://www.researchgate.net/publication/271617817\\_Collectible\\_Card\\_Games\\_as\\_Learning\\_Tools](https://www.researchgate.net/publication/271617817_Collectible_Card_Games_as_Learning_Tools)

<sup>23</sup> The Power of Card Games: Fostering Cognitive Flexibility in Kids: <https://www.hatching-dragons.com/blog/the-power-of-card-games-fostering-cognitive-flexibility-in-kids><sup>24</sup> Amazon.com: Thought-Spot Mad Smartz Anger Management & Social Skills Game for Kids & Teens:

<https://www.amazon.com/Thought-Spot-MAD-SMARTZ-Interpersonal-Skills/dp/B07L5W9737><sup>25</sup> Fun

Card Games for Kids: Boost Skills & Build Connections | Speech Blubs:

<https://speechblubs.com/blog/fun-card-games-for-kids-boost-skills-build-connections/><sup>26</sup> Gambling disorder in adolescents: prevalence, new developments, and treatment challenges - PMC:

<https://pmc.ncbi.nlm.nih.gov/articles/PMC5841330/><sup>27</sup> Full article: Gambling disorder comorbidity a narrative review: <https://www.tandfonline.com/doi/full/10.1080/19585969.2025.2484288><sup>28</sup> The Talking, Feeling & Doing Conflict Resolution Toss & Talk Card Game — Childs Work Childs Play:

<https://childswork.com/products/copy-of-the-talking-feeling-doing-conflict-resolution-toss-talk-card-game-with-ball><sup>29</sup> The Impact of Emotions in Negotiation | HBS Online:

<https://online.hbs.edu/blog/post/emotion-in-business-negotiation><sup>30</sup> Gamelandia:

<https://gamelandia.fun/><sup>31</sup> Social Identity Framework and Gender-Based Harassment in Digital Gaming Spaces: A Scoping Review - Adefope - 2025 - Human Behavior and Emerging Technologies - Wiley Online Library: <https://onlinelibrary.wiley.com/doi/10.1155/hbe2/1811677><sup>32</sup> Where you can learn to play the Pokémon card game in Los Angeles | LAist: <https://laist.com/news/los-angeles-activities/where-you-can-learn-to-learn-to-play-the-pokemon-card-game-in-los-angeles-card-shops><sup>33</sup> Game Crave Tournament Store - TCG, Board Games, & Miniatures: <https://gamecravetx.com/><sup>34</sup> Collectible Card Games Market Size & Outlook, 2026-2034:

<https://straitsresearch.com/report/collectible-card-games-market><sup>35</sup> Phenomenal Games | Trading card games store | Phenomenal Games, North White Horse Pike, Lindenwold, NJ, USA:

<https://www.keepitpg.com/><sup>36</sup> Heart of the Game | Discover, Play, Conquer Today:

<https://heartsofthegame.com/><sup>37</sup> Hiding in the shadows: a qualitative exploration of women gamers identities and perceptions of the video gaming context | SN Social Sciences:

<https://link.springer.com/article/10.1007/s43545-024-00980-z><sup>38</sup> Video Games Exposure and Sexism in a Representative Sample of Adolescents - PMC:

<https://pmc.ncbi.nlm.nih.gov/articles/PMC5374198/><sup>39</sup> American Psychological Association. (2020). *Violence in video games and the role of cognitive and emotional factors.*<sup>40</sup> Entertainment Software Association. (2024). *Essential Facts About the Video Game Industry.*<sup>41</sup> Griffiths, M. D., et al. (2012). *The role of structural characteristics in gambling and video game playing.* Journal of Behavioral Addictions. <sup>42</sup> Green, C. S., & Bavelier, D. (2012). *Learning, Attentional Control, and Action Video Games.* Trends in Cognitive Sciences. <sup>43</sup> Nenzén, A., &(client). (2024). *Skinnerian Mechanics in Modern Collectible Games.* Journal of Gambling Studies. <sup>44</sup> Oldenburg, R. (1989). *The Great Good Place.*<sup>45</sup> Piaget, J. (1972). *The Psychology of the Child.*<sup>46</sup> Subramanyam, K., & Greenfield, P. (2008). *Online Communication and Adolescent Relationships.*