AUTIVERSE: Eliciting Autistic Adolescents' Daily Narratives through AI-guided Multimodal Journaling

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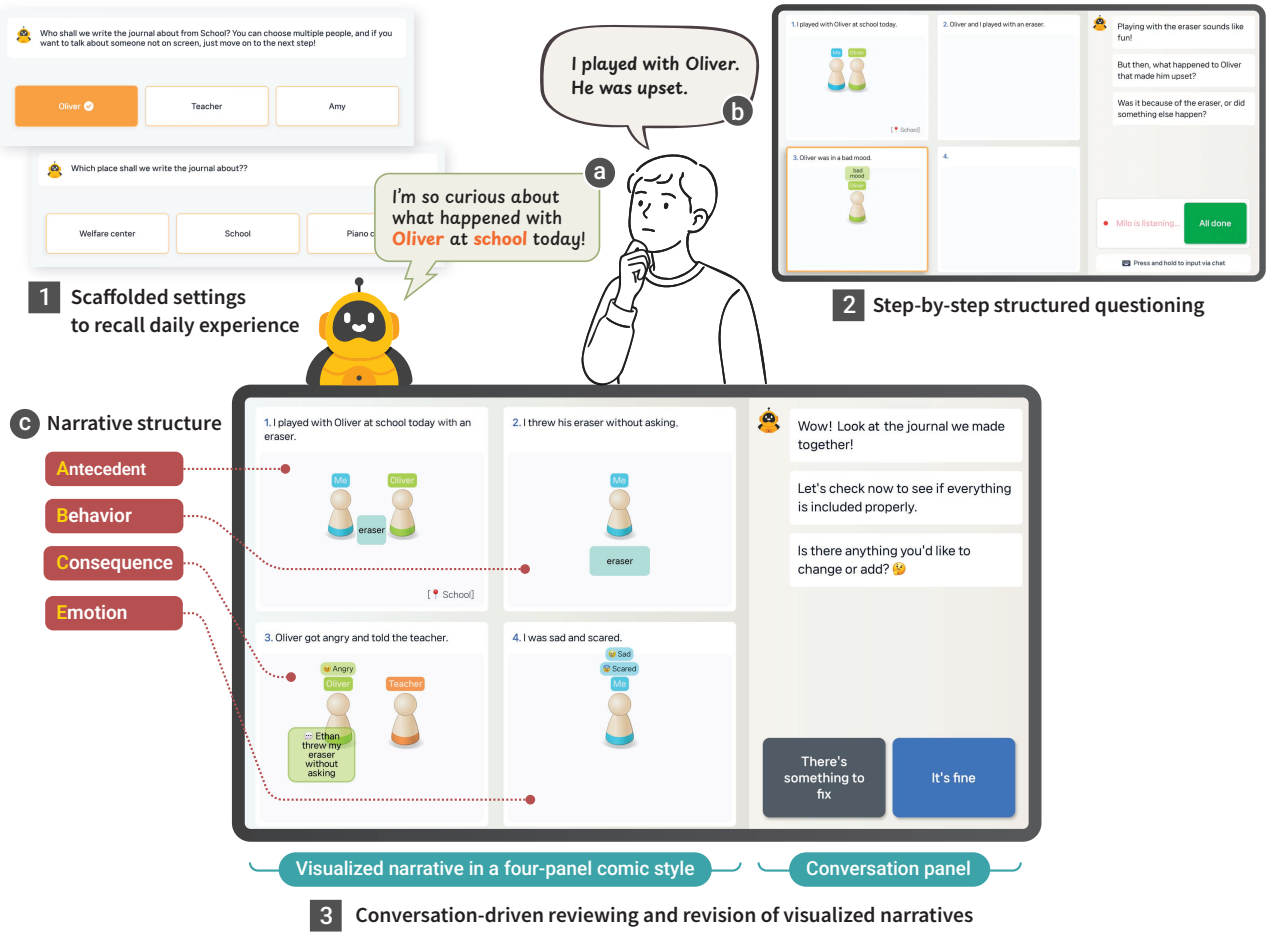

Figure 1: AUTIVERSE enables autistic adolescents' journaling by providing scaffolding layers driven by a peer AI. A journaling session starts with the initial specification of place and people 1, then the AI carries on a conversation (ⓐ). It segments what the adolescent has spoken (ⓑ) in a specific structure (ⓒ) and elicits missing parts via step-by-step questioning 2. To aid autistic adolescents' comprehension and expression, the system provides a token-based visual representation of the current narrative in a four-panel comic strip 3.

Abstract

Journaling can potentially serve as an effective method for autistic adolescents to improve narrative skills. However, its text-centric nature and high executive functioning demands present barriers to practice. We present AUTIVERSE, an AI-guided multimodal journaling app for tablets that scaffolds storytelling through conversational prompts and visual supports. AUTIVERSE elicits key details through a stepwise dialogue with peer-like, customizable AI and composes them into an editable four-panel comic strip. Through a two-week deployment study with 10 autistic adolescent-parent dyads, we

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examine how Autiverse supports autistic adolescents to organize their daily experience and emotion. Autiverse helped them construct coherent narratives, while enabling parents to learn additional details of their child's events and emotions. The customized AI peer created a comfortable space for sharing, fostering enjoyment and a strong sense of agency. We discuss the implications of designing technologies that complement autistic adolescents' strengths while ensuring their autonomy and safety in sharing experiences.

CCS Concepts

• **Human-centered computing** → **Accessibility systems and tools**; **Empirical studies in HCI**.

Keywords

Journaling, autism, adolescents, large language model, scaffold, visual support, conversational agents

1 Introduction

Adolescence is a critical developmental period for cultivating identity and independence [28], characterized by increased autonomy from caregivers [97], deeper immersion in peer relationships [17, 97], and more sophisticated self-reflection [13]. For autistic adolescents[1], however, this period presents an additional set of cognitive, emotional, and communicative challenges [64]. Navigating heightened social risks such as peer conflict and bullying [25, 98], they often struggle to convey these experiences to their parents [50]. This challenge arises from the substantial cognitive demands of narrative construction—the process of translating complex daily events into a coherent verbal story [18, 62]. This task is particularly taxing for autistic adolescents, as it depends heavily on verbal articulation, which often contrasts with their strengths in visual information processing [85, 86]. Consequently, parents face a persistent dilemma: Fostering their child's increasing autonomy while simultaneously safeguarding them from harm [95]. Lacking reliable communication regarding daily events and associated social and emotional responses, caregivers often rely on fragmented or ambiguous self-reports, which complicate both understanding and timely intervention [72].

Journaling is a promising method to improve narrative skills, which can incrementally strengthen narrative competence by providing repeated opportunities to rehearse event organization, causal linking, and reflective meaning-making [21, 77]. However, it can be particularly burdensome for autistic adolescents due to its text-centric nature and high demand on executive functioning. Requiring autistic individuals—who often possess strong visual thinking skills [85, 86]—to express complex experiences exclusively through text overlooks their inherent cognitive strengths. In addition, the unstructured nature of the blank page imposes significant demands on executive functions, such as planning, sequencing, and language formulation [41]. Therefore, autistic adolescents may benefit from alternative journaling approaches that provide structure, reduce linguistic demand, and incorporate visual aids that facilitate their storytelling.

Yet, research on supporting autistic adolescents' journaling is largely underexplored, and only a handful of studies have explored the potential of structured self-tracking [60] of challenging behaviors (*e.g.*, [51]) rather than freeform journaling of daily experience. Outside the autism context, the HCI community has explored scaffolding in journaling for children or adolescents, often leveraging Large Language Models (LLMs). These include chatbots that assist documenting daily experiences [52] or prompt children to share emotions [91]. However, they often rely on text-only dialogues as the primary interaction modality.

In this work, we investigate ways to facilitate autistic adolescents' journaling, to help them organize facts and feelings surrounding their daily events. Inspired by previous research demonstrating the benefits of using LLMs to provide conversational scaffolding across diverse topics (*e.g.*, [52, 91]) as well as to organize structured information from freeform dialogues (*e.g.*, [20, 93]), we explore how LLMs can support autistic adolescents in narrative construction. To better understand their specific needs and preferences, we first conducted formative interviews with five autism experts and six parents of autistic adolescents. We found a strong need for structured scaffolding to guide narrative construction and mitigate the difficulty of responding to open-ended prompts (*e.g.*, "*How was your day?*"). Participants emphasized the importance of visual aids in offloading the cognitive burden of verbal expression and expressed a desire for adolescents to engage in journaling autonomously, without excessive parent mediation that may hamper their sense of ownership.

Informed by these findings, we designed and developed Autiverse, a tablet-based AI-guided multimodal journaling system (Figure 1). Autiverse leverages LLMs to generate conversational scaffolding, analyze information fragments, and generate comic strips in a declarative format. By designing the AI agent to have a peer persona, Autiverse engages autistic adolescents in a spoken/text conversation to gather information about an event of the day, incorporating the ABC (Antecedent-Behavior-Consequence) model [94] along with emotion expression [35]. Based on the collected information, the system presents a story in the form of a 4-panel comic strip, which the adolescent reviews and revises in collaboration with the system. It serves as a visual aid that could potentially reduce reliance on linguistic expression while promoting intuitive, reflective storytelling.

To examine how Autiverse supports autistic adolescents to recount their daily experience and its emotional impact, we conducted a two-week home deployment study with 10 autistic adolescent-parent dyads in South Korea. During the deployment period, adolescent participants journaled by conversing with an AI peer using Autiverse, while a parent sat nearby in a safeguard role. Our results indicate that Autiverse scaffolded coherent narratives and surfaced additional details about events and emotions. The AI peer provided a comfortable, nonjudgmental context for disclosure, making sharing feel enjoyable and under adolescents' own control. Parents, in turn, learned new information about their child's day and used it as a conversational bridge at home. Together, these findings suggest a practical, family-compatible pathway for AI-based

[1]In this work, we use identity-first language (*e.g.*, autistic adolescent) rather than person-first language (*e.g.*, adolescent with autism), considering the preferences of autistic individuals [49] and recent academic trends [15].

journaling that can support narrative development and reflection in everyday life. The contributions of this paper are fourfold:

(1) Empirical insights from a formative study with autism experts and parents, identifying key challenges of eliciting narratives from autistic adolescents and design considerations for journaling systems in the field.
(2) The design and implementation of AUTIVERSE[2], a novel AI-guided multimodal journaling system that incorporates a customizable AI peer that helps scaffold narrative construction for autistic adolescents through conversation with visual supports.
(3) Empirical findings from a two-week deployment with 10 autistic adolescent-parent dyads, including direct accounts from the adolescents themselves, demonstrating how AUTIVERSE was used for journaling and its perceived effects on adolescents and parents.
(4) Design implications for an adaptive AI scaffold that supports autistic adolescents, fostering multimodal narrative practice while enabling greater developmental autonomy.

2 Related Work

In this section, we first cover the literature on social communication challenges of autistic adolescents. We then discuss journaling as an established, though demanding, method for narrative construction. We conclude by reviewing prior work on both the use of visual aids to mitigate cognitive load and the role of conversational AI as a collaborative partner for journaling.

2.1 Social Communication Challenges of Autistic Adolescents

Autistic adolescents demonstrate differences in social communication and interaction due to fundamental variations in cognitive processing that cause persistent challenges [26, 33]. For example, they often struggle to share attention with another person toward an object or event (*i.e.*, joint attention) [71], tend to focus on details rather than comprehending broader contexts or constructing a cohesive narrative [38, 45]. Additionally, deficits in Theory of Mind—the ability to infer and reason about others' mental states—can make it difficult to anticipate how one's words and actions will be interpreted by others [8].

These underlying cognitive characteristics manifest in tangible challenges during everyday social exchanges. Autistic individuals often struggle to interpret subtle nonverbal cues, such as facial expressions or prosody, which typically convey emotional nuance or contextual meaning [39]. In parallel, a high prevalence of alexithymia—difficulty identifying and articulating one's own emotions—further limits their expressive capacity [12]. As a result, interactions that seem routine to neurotypical peers, such as recounting the day's events, may become cognitively and emotionally demanding tasks for autistic adolescents. Consequently, the dynamic and reciprocal nature of conversation (*e.g.*, initiating exchanges, turn taking, and maintaining topic coherence) can be particularly strenuous [90].

These challenges become especially salient during adolescence, a developmental stage where nuanced peer relationships and emotional self-disclosure are increasingly important [17, 104]. Communicative differences during this period can act as significant barriers to forming friendships, participating meaningfully in classroom interactions, and avoiding social isolation [9, 109]. One area where these difficulties are particularly pronounced is personal storytelling, which requires the speaker to recall, organize, and express past experiences in a coherent and emotionally intelligible manner. Prior work has shown that narratives produced by autistic individuals are often fragmented, overly literal, or lacking in emotional context [18, 72]. This hinders their ability to share inner experiences with others, limiting opportunities for relational development, empathy-building, and social learning.

2.2 Journaling for Narrative Development in Autistic Individuals

Journaling is known to be a viable method to strengthen narrative skills through repeated practice with event structuring, causal linkage, and reflective meaning-making [21, 77]. This process of externalizing thoughts enables individuals to organize fragmented memories into a coherent personal narrative, which in turn fosters a stronger sense of identity by allowing them to derive deeper meaning from their life events [78, 107].

From a developmental psychology perspective, these benefits are particularly salient for autistic adolescents. For them, journaling strengthens the autobiographical memory and narrative identity [40, 62, 106] and facilitates the training of emotional expression [66]. However, HCI research in this area remains sparse [42, 84, 88], often focusing on capturing structured data about predetermined phenomena (*e.g.*, mom's nagging [51]) rather than open-ended narratives [46, 51]. This gap is consequential because the unique characteristics of autistic adolescents pose barriers to practice journaling themselves; they often feel difficulty organizing their experience into chronologically ordered and causally coherent narratives, with prior work documenting challenges across coherence, evaluation, and pragmatic structure [24, 62].

To address these challenges, we propose a journaling system that lowers these cognitive demands while supporting their autonomy, with the following two key components: (1) visual support for structuring experiences, and (2) a conversational AI that offers scaffolding while encouraging self-disclosure. We detail each in light of prior work in the following sections.

2.3 Visual Aids to Reduce Cognitive Demands

A core principle in autism intervention is that pairing information with congruent visual aids can significantly reduce structural and cognitive demands by leveraging strengths in visual processing [85, 86]. For example, canonical autism intervention tools such as Social Stories [37] and Comic Strip Conversations [36] recommend using images that align with the content of the guidance and conversation, to engage the autistic individuals and enhance their comprehension. Similarly, many frameworks for communication with autistic individuals (*e.g.*, SCERTS [82] and TEACCH [67]) emphasize visual mediation to streamline communication, such as

[2]The source code of AUTIVERSE will be open-sourced soon.

symbol cards, photographs, and visual diagrams; a classic example is a visual schedule, which uses a sequence of picture cards (*e.g.*, 'Breakfast,' 'School Bus,' 'Reading Time') to make the day's events predictable and understandable in TEACCH [67]. High-tech adaptations, such as animations for emotion recognition [34] and tablet-based prompt apps [4, 32], further increase engagement and facilitate targeted skill acquisition. However, a common thread unites these approaches: they are primarily designed for receptive communication—to teach skills or convey information to the autistic individual. They offer limited support for expressive communication, specifically for constructing and conveying their own narratives.

Inspired by the benefits of visual aids to supplement narrative construction, this work synthesizes journaling and visual aids. In contrast to recent youth journaling tools that remain largely text-based [52, 91], our system incorporates the token-based visual representation of narrative in a four-panel comic strip format, which is co-constructed through conversation with an AI agent, aiming to retain autonomy and ownership while easing cognitive demands in organizing and expressing daily experiences.

2.4 Conversational AI as a Collaborative Partner

Conversational agents shift narrative support from static templates to mixed-initiative interaction, enabling the agent to elicit details, repair omissions, and propose structure dynamically. In mental health and education domains, context-based dialogue systems have proven effective in scaffolding reflection and reasoning, such as CBT micro-interventions [31] and mixed-initiative tutoring [31]. Within HCI, recent youth-focused systems have begun to utilize large language models (LLMs) to support journaling and emotional disclosure, demonstrating that lightweight conversational prompts can reduce initiation costs and sustain engagement [52, 91].

In the autism context, AI agents have typically served one of two roles: either as *instructors* for training social communication skills [3, 10, 47, 70, 83, 92, 105], or as *elicitors* of personal narratives [10, 55, 100]. While the former has been the dominant approach, the latter is crucial for shifting the focus from scripted performance to the articulation of lived experiences [54, 55]. For example, Kumazaki *et al.* [55] showed that robotic systems promote autobiographical disclosures in autistic adolescents. However, the collaborative potential of these AI agents remains largely untapped, as the role is typically confined to a passive interviewer that prompts for content, thereby hindering the user's ability to autonomously organize their own narratives.

To address the critical gap, we design an AI agent that can be a collaborative partner in autistic adolescents' journaling. The agent serves a dual role: as a conversational partner, it provides targeted prompts to effectively scaffold the daily experience. More than just a question-asker, the AI agent actively works with the user to organize and structure their expressed thoughts into a coherent narrative. Simultaneously, it adopts the persona of a friend to foster a supportive environment that encourages engagement and self-disclosure. Through such collaboration, we aim to maintain the adolescents' autonomy in journaling activities as well as to foster a sense of ownership.

3 Formative Study

To inform the design of Autiverse, we conducted formative interviews with five autism experts and six parents of autistic adolescents. We aimed to (1) understand the challenges that autistic adolescents and their communication partners (*i.e.*, parents, teachers, or therapists) face in engaging in everyday conversations and (2) identify the strategies used to foster more natural and meaningful exchanges. We tailored the interview protocols for each group—experts and parents—and conducted remote interviews separately to elicit their unique experiences and perspectives. We recruited participants from both groups through snowball sampling and via the internal network of one researcher, who is an autism specialist.

3.1 Procedure and Analysis

3.1.1 Interviews with Autism Experts. We recruited five autism experts (E1–5) who have years of experience and expertise in communicating with autistic adolescents. The experts included two special education professors, one special education teacher, one autism-focused music therapist, and one developmental assessment specialist from a psychiatry department. The experts had an average of 19 years of experience (ranging from 15 to 23 years), and all of them had clinical experience with autistic adolescents in promoting their language and behavioral development.

We first asked the experts about the characteristics and challenges that autistic adolescents face in everyday conversations, as well as the strategies that experts use to understand their intentions and facilitate reciprocal interactions. We then presented a storyboard as a slideshow to help the experts understand the concept of an AI-guided multimodal journaling system. The storyboard prototype depicted a scenario in which a parent and an autistic adolescent are sitting in front of a tablet side by side, while the adolescent engages in a conversation with an AI agent in the system to create a draw-and-write journal about "*what happened today.*" This scenario was developed in consultation with one of the authors, who is an expert in autism communication strategies with extensive counseling and clinical experience. We asked the experts about clinically appropriate AI behaviors, conversational directions, design considerations to support unique usability needs for autistic adolescents, features that could enhance engagement for repeated use, and minimize potential risks. The interviews lasted about 1 to 1.5 hours. We offered a 100,000 KRW (approx. 72 USD) gift card as compensation.

3.1.2 Interviews with Parents of Autistic Adolescents. We recruited six parents (M1–6; all mothers) of autistic adolescents. Five had sons and one had a daughter, with an average age of 15.67 years (ranged 13-18, $SD = 1.75$). The interview began with a discussion about the characteristics and challenges of having daily conversations with their child. We then asked them to share the efforts they had made to improve these conversations and the strategies that led to successful outcomes. As with the expert interviews, we presented the same storyboard as a probe to elicit their perspectives on design considerations from a parental standpoint, as well as the potential roles AI could play in eliciting everyday experiences from their child. Each interview lasted approximately one hour, and participants received a gift card worth 50,000 KRW (approx. 36 USD) as compensation.

3.1.3 Analysis. All interviews were audio-recorded and later transcribed. Applying thematic analysis [16], one researcher open-coded the transcript to identify emerging themes. The entire research team then finalized the themes through multiple rounds of discussion. In the following, we present the findings from the formative study.

3.2 Finding 1: Difficulty in Open-Ended Daily Conversations

Both parents and experts reported that autistic adolescents struggle with open-ended daily conversations, especially when asked to initiate or structure their own narratives. Two interrelated difficulties emerged: (1) cognitive overload triggered by non-specific prompts, and (2) a subsequent challenge in presenting experiences coherently for a listener.

3.2.1 Struggling to Answer Non-Routinized Open-Ended Questions. Autistic adolescents suffered from cognitive overload induced by broad questions such as "*What happened today?*". Such open-ended prompts place high demands on executive functioning, requiring adolescents to select and structure a single experience from countless possibilities. E5 remarked, "*When someone asks, 'What did you do today?', they don't know what to choose to talk about among the thousands of things they did. [...] I ask short questions to help them decide what to say.*"

This difficulty was especially noticeable when adolescents received new inquiries (E1, E3–4, and M4), while they could often respond to familiar prompts. E4 noted, "*When it comes to recalling something new or bringing up experiences they had on their own, that's really difficult for them.*" This difficulty with these inquiries points to the importance of a structured format for these adolescents. As the participants observed, unfamiliar questions without structured cues can lead to communicative breakdowns, reinforcing their reliance on predictable conversational patterns. E3 stressed, "*Open-ended or reflective questions often lead to a sense of failure for them, so it's important to begin with things they can answer to help them feel more secure.*"

3.2.2 Struggling to Describe Daily Experiences. Both groups of participants consistently reported that autistic adolescents often struggled to communicate recalled events coherently. As a result, caregivers found it challenging to sequence events and identify relevant details, as they had to interpret and reconstruct meanings from incomplete and disjointed pieces of a narrative. M6 noted, "*What is most challenging is that I have to piece together clues and make inferences like 'Ah, maybe he did this because of that.'*"

This difficulty seems to reflect autistic adolescents' core challenge in organizing lived experiences into coherent and structured accounts (E1–5, M1–2, M4, and M6). E1 explained, "*If I give them a clear plot, they can do really well. But if I just say 'Tell me what happened,' they jump from one thing to another. They have trouble organizing their experiences into a coherent story.*" This was often compounded by a highly self-referential perspective (E1, E4, M1, and M3), with adolescents showing "*a tendency to focus on themselves rather than attending to the surrounding context or engaging in reciprocal conversation*" (E4).

3.3 Finding 2: Visual Scaffolds for Eliciting Daily Narratives

All participants reported that visualization or visual materials (*e.g.*, drawings, photos, or objects) were highly effective for eliciting detailed responses by making abstract memories more concrete and reducing cognitive load. As M4 noted, "*Giving even a simple visual cue, like drawing a comic, helps the child share his thoughts in much more detail. I realized how effective those visual prompts can be.*"

Although often effective, current visual methods were also constrained by various factors. For example, requiring adolescents to draw from scratch can be counterproductive, particularly for those with anxiety or perfectionistic tendencies. E1 explained, "*Some kids with co-occurring anxiety disorders hesitate to even begin, fearing that they might not draw well.*" Participants also pointed out that existing visual materials are often too rigid or static to represent emotionally nuanced situations (M3–4). M3 commented, "*The available visual materials are quite limited, making it difficult to present them flexibly and appropriately in each situation.*"

Beyond these limitations, participants expressed differing views on the appropriate level of visual detail. While some (M1, M5) advocated for rich, 'Studio Ghibli'-like illustrations for engagement (M1), the majority (E2, E4–5, M2, M4, M6), particularly experts, argued that simpler visual representations are generally more effective. E4 explained, "*Here, the symbols themselves are not the key—the important thing is that the child recalls their day. If the illustrations are too detailed, children may get lost in those details rather than focusing on their memories.*" Similarly, M2 noted, "*If the visual is too detailed and differs from what the child imagined, it could lead to confusion. However, many children are already familiar with symbolic representations since they often encounter them in therapy settings.*"

3.4 Finding 3: Balancing Parental Involvement while Cultivating Independence

Some parents (M2–3) emphasized that the long-term goal of journaling should be fostering autistic adolescents' independent and self-initiated narration. In reality, as these adolescents often require co-regulation and safety monitoring [82, 101], parents usually stay with them or nearby. As a result, it appeared to be challenging for parents to negotiate the balance between supporting independence and continuing parental involvement. M2 remarked: "*My child's level of dependency on me is unlike that of most adolescents. The goal is to support their independence by stepping back, so our relationship is quite different from that of typical parents and teens.*"

Regarding the idea of AI-guided journaling, participants emphasized that parents should play a subsidiary role, as the "*ultimate goal is to do it on [child]'s own*" (M5). Experts further stressed that in journaling contexts—where adolescents articulate their experiences and thoughts—parental involvement should be carefully designed to minimize proactive involvement. Without clear guidance, they warned, parents may "*unintentionally engage in negative forms of involvement*" (E3)—a risk amplified in autism, where adolescents show increased sensitivity to negative parental attitudes [7]. To mitigate this, experts recommended that systems explicitly encourage parents to "*observe, instead of participate,*" as excessive intervention could lead adolescents to resist using the tool (E4).

4 AUTIVERSE

Informed by the formative interviews, we designed and developed AUTIVERSE, an AI-guided multimodal journaling system for autistic adolescents. In this section, we describe the design rationales derived from the formative interviews, present the user interface and system components of AUTIVERSE. We then illustrate the generative pipelines in the system, along with implementation details.

4.1 Design Rationales

DR 1. Structure Experience through Routines. Building on formative insights and prior works, we designed a structured narrative scaffold—instead of broad, open-ended prompts—to help adolescents organize daily experiences. We initiate conversations with concrete situational anchors (*e.g.*, location, people involved) to reduce ambiguity and support memory retrieval, in line with evidence on supportive questioning for autistic communicators [73]. To support narrative construction, we designed the system to follow a stepwise dialogue structure inspired by *ABC model* [94], an evidence-based approach that frames behavior by breaking it into **antecedent** (environmental context), **behavior** (the main event), and **consequence** (the result of the event). Given the importance of emotional awareness of both neurodiverse [43] and neurotypical [35, 91] children, we appended **emotion** to the three stages, to foster emotional awareness and reflection. (We refer to this extended model as the ABC-E format hereinafter.) By internalizing this scaffold structure, we aimed to encourage adolescents to develop narrative competence by learning how to organize and share their experiences in socially intelligible ways.

DR 2. Balance Flexibility and Executive Load through Visual and Conversational Scaffolds. Our formative interviews and existing literature [41, 65, 102] highlight the need for simplified visual scaffolds that maintain expressive flexibility while minimizing the executive load to produce them. To this end, we incorporated an AI-generated **four-panel comic strip** for journaling, with each panel corresponding to each component of the ABC-E format (see DR1). In each panel scene, we used simplified token-based visual representations to describe it (see 3 in Figure 1) to avoid unintended distractions caused by detailed images [89].

We complement this visual support with a conversational scaffold, where an AI agent guides the overall journaling process. The AI agent uses **step-by-step questioning** to incrementally elicit the A, B, C, and E components through small, sequential prompts. This method reduces the cognitive demands of spontaneous storytelling by breaking the task into manageable units—a technique universally endorsed by our expert participants (E1–4) and aligned with prior AI-driven prompting methods [59, 91]. Taken together, this dual-scaffold approach, combining the token-based four-panel comic strip and step-by-step conversational AI, preserves expressive flexibility while offloading executive and motor demands, enabling low-friction journaling for autistic adolescents.

DR 3. Prioritize Adolescent-AI Interaction. Considering the tension between parental support and adolescent autonomy, we prioritized the adolescents' independence and designed the interface on the assumption that they would interact with the system on their own. We intentionally positioned the parent as a supportive observer to ensure safety while respecting their child's autonomy. We also designed the AI to have a peer persona (*c.f.*, [91]) of the adolescent's preference that communicates in a playful tone and offers corrective feedback in a friendly and non-authoritative manner. This design draws from our formative study participants that adolescents may "*laugh and take it[feedback from AI] more lightly*" (M6) while they might react defensively to parents, as well as the observations in literature that adolescents tend to be more receptive to informal, peer-style interactions than to adult-led instruction, particularly in emotionally sensitive contexts [19].

4.2 User Interface and Interaction with AUTIVERSE

Figure 2 illustrates the user flow of journaling with AUTIVERSE, where an autistic adolescent records a journal entry for the day. This process consists of six sequential phases: (1) Preparation, (2) Articulation, (3) Verification, (4) Elaboration, (5) Revision, and (6) Wrapup. Each phase was carefully designed to complete a four-panel comic strip, grounded in the ABC-E format. By using a stepwise dialogue structure, we support users in recalling and organizing their daily experiences and emotions. In the following, we describe each phase and associated interactions by an imaginary autistic adolescent, Ethan: *Every evening, 12-year-old Ethan sits at the desk and launches the AUTIVERSE app on a tablet to record his day through a four-panel comic strip. On the home screen, Ethan presses the* Start *button to start journaling for the day. His AI peer, Milo, appears and greets him.*

Preparation: Identifying settings and characters (1 in Figure 2). Milo first asks, "`Which place shall we write the journal about?`" along with a set of familiar locations Ethan often visits. Ethan selects School, recalling something that happened there. Milo then follows up with a question about who was involved, presenting a list of familiar people from school. Ethan chooses his friend, Oliver.

Articulation: Collecting initial narrative (2 in Figure 2). Based on the selected place and people (ⓐ in Figure 2), Milo responds playfully, "`I'm so curious about what happened with Oliver at school today! Tell me everything!`" Ethan replies, "*I played with Oliver. He was upset.*"

Verification: Verifying preliminary structured narrative (3 in Figure 2). Milo processes the input and displays a structured outline on the left side of the screen: ['1: I played with Oliver at school today.', '2: Oliver was in bad mood.'] (ⓓ in Figure 2). Milo checks with Ethan to ensure shared understanding, asking: "`I see! Then let's try writing today's journal entry using what you just told me. Is anything incorrect here?`" Ethan presses the All correct button. Milo cheerfully continues, "`Great! I'll draw your comic strip based on what you told me.`"

Elaboration: Supplementing missing details in the ABC-E format (4 in Figure 2). A four-panel comic strip is generated and appears on the screen. There are two empty panels since the information corresponding to B and E was missing. Milo notes, "`I couldn't draw everything with the information I had. Could you help me fill in the missing parts?`", and Ethan agrees. After confirming that Ethan and Oliver played with an

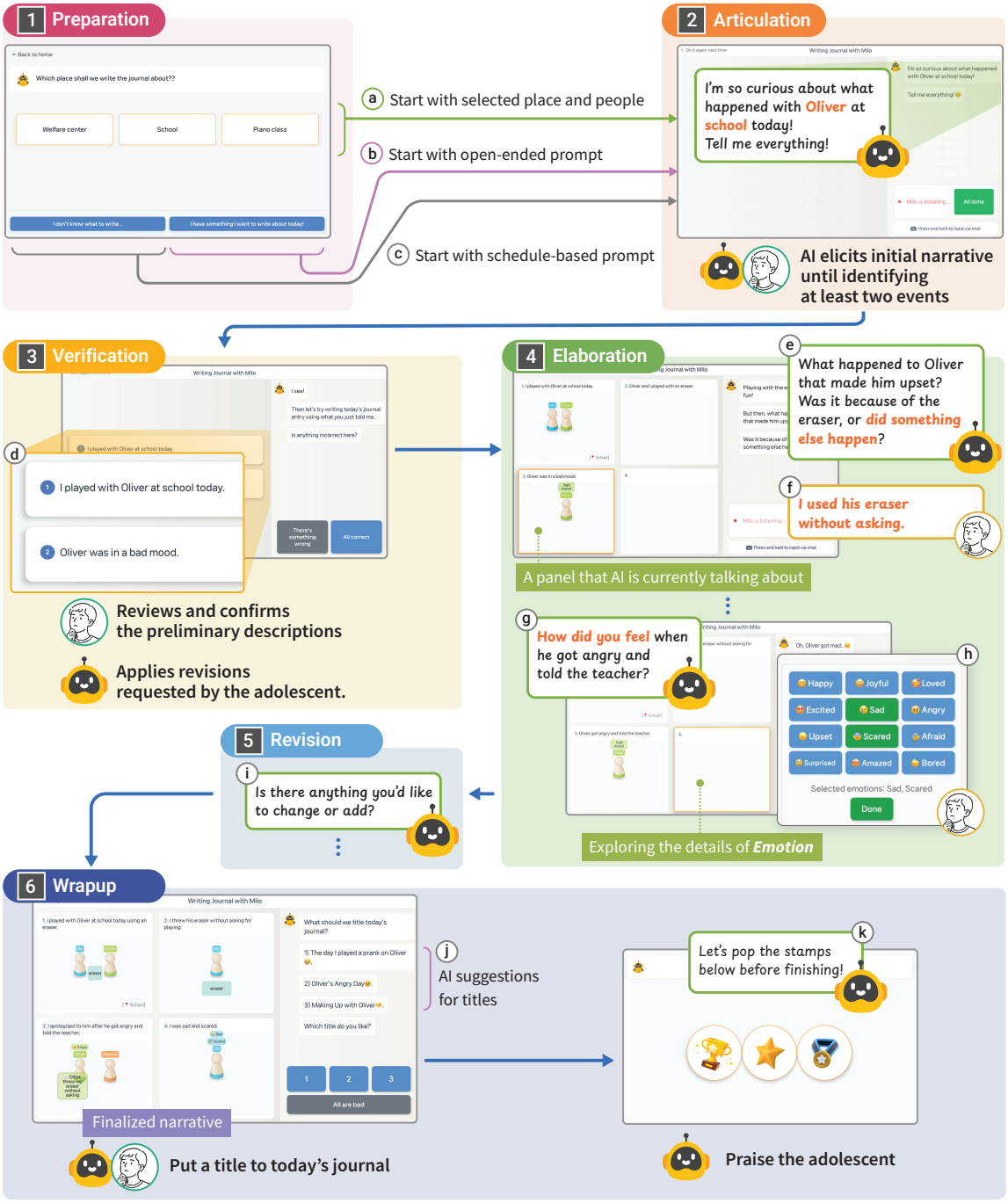

Figure 2: Main screens and usage flow of AUTIVERSE. 1 The user begins the journal by choosing one of three prompt types: starting with ⓐ a selected place and people, ⓑ an open-ended prompt, or ⓒ a schedule-based prompt. 2 The AI elicits an initial narrative from the user. 3 The AI presents ⓓ preliminary descriptions based on the user's narrative, which the user then reviews and confirms, and applies revisions requested by the user. 4 ⓔ The AI asks questions about missing details and ⓕ the user respond. Specifically, ⓖ when asking the user's emotions, the AI provides ⓗ a list of buttons for 12 emotions. 5 Based on the updated comic strips, ⓘ the AI asks the user whether to make any final changes or additions. 6 To wrap up, the AI offers an empathetic response and ⓙ title suggestions for the finalized narrative, and after completion, it praises the user by ⓚ awarding stamps.

eraser, Milo prompts, "`Playing with the eraser sounds like fun! But then, what happened to Oliver that made him feel bad? Was it because of the eraser, or did something else happen?`" (ⓔ in Figure 2). Ethan replied "*I used his eraser without asking.*" (ⓕ in Figure 2), and the panel B's description is updated accordingly. Milo then continues, "`How did you use the Oliver eraser? Did you just erase it quickly, or did you do something else too?`" Ethan replies, "*I threw it and played.*" Milo follows up, "`Oh, I see. What was Oliver's reaction when he saw you throwing the eraser? Did he get angry, or did he say something?`" Ethan answers, "*He got angry and told the teacher.*" The panel description is updated again. Milo now asks about the emotion to elicit a clue for panel E: "`Oh, Oliver got mad.. How did you feel when he got angry and told the teacher?`" (ⓖ in Figure 2). A set of 12 emotion cards appears on the screen (ⓗ in Figure 2). Ethan looks at the cards and selects sad and scared buttons.

Milo responds warmly, "`Thanks for answering my questions. Now I can draw in the rest of the panel!`" The updated panel descriptions are: ['A – I played with Oliver at school today using an eraser.', 'B – I threw his eraser without asking for playing.', 'C – Oliver got angry and told the teacher.', 'E – I was sad and scared.'].

***Revision*: Reviewing and refining complete journal (5 in Figure 2).** With the updated four-panel comic strip, Milo asks, "`Is there anything you'd like to change or add?`" (ⓘ in Figure 2). Ethan presses There's something to fix button. Milo asks "`Which part do you want to change, and how?`" and Ethan replies, "*I apologized him.*" With this addition, Milo immediately updates the panel C. "`Is everything correct now?`" Milo asks. Ethan confirms and presses the Yes button.

***Wrapup*: Putting a title and rewarding the adolescent (6 in Figure 2).** Milo thanks Ethan for sharing his story and responds based on the completed panel description, "`So you and Oliver had a falling out at school and hurt each other's feelings. It breaks my heart to hear you felt sad and scared. I'll be rooting for you to have better things happen next time!`" Then Milo says "`What should we title today's journal?`" listing three candidate titles (ⓙ in Figure 2). Ethan chooses the first one, '`The day I played a prank on Oliver.`' Milo says "`I'm glad you liked 'The day I played a prank on Oliver'! Once you've checked the completed journal on the left, let's move on to the next one!`" After reviewing the finalized comic strip, Ethan presses the Next button. Then, Milo awards Ethan three stamps as a reward for finalizing a session (ⓚ in Figure 2).

4.3 Generative Pipelines

All phases except Preparation, which consists of only touch inputs, incorporate generative pipelines with LLM-infused components for conversation, dialogue analyses, and structured information generation. Figure 3 illustrates the generative pipeline flows of phases from Articulation to Wrapup.

4.3.1 Identifying Main Event. In the Articulation phase, the chatbot aims to elicit at least two pieces of events from the adolescent. For each turn, the current dialogue (ⓐ in Figure 3) is analyzed by **Event Extractor** (ⓑ in Figure 3), which identifies pieces of events (ⓒ in Figure 3; *e.g.*, "*I played with Oliver.*" and "*Oliver felt bad.*" extracted from adolescent message, "*I played with Oliver and he felt bad.*"). The **Question Generator** (ⓓ in Figure 3) generates the next AI message considering the current dialogue and other contexts (ⓔ in Figure 3), including the adolescent's profile (*e.g.*, age, gender, interests), customized AI peer profile, and the place and people set in the Preparation phase. These contexts ensure that the generated questions are considerate of the adolescent's cognitive profile, allowing the AI to acknowledge off-topic responses appropriately, while gently guiding the conversation back to the day's main events.

4.3.2 Constructing Panel Descriptions. In the Elaboration phase, the system iteratively updates the panel descriptions of the comic strip (ⓕ in Figure 3) to organize a journal entry in the ABC-E format. At each iteration, the **Story Analyzer** (ⓖ in Figure 3) inspects the current panel descriptions based on three criteria (ⓗ in Figure 3): (1) Whether the main events involve troubles such as social or emotional conflict; (2) whether there are missing or underdeveloped elements (*e.g.*, missing actors, unclear actions, or insufficient emotional description) for each panel description; and (3) whether each panel description adheres to the ABC-E format and whether the descriptions within a panel present events in chronological order. If the **Story Analyzer** determines that all panel descriptions are complete and correctly ordered, the system proceeds to the next phase (Revision).

Otherwise, the **Question Generator** (ⓘ in Figure 3) generates the next AI question to elicit the missing elements from the adolescent (*e.g.*, "`What happened to Oliver that made him feel bad?`"). Similar to **Question Generator** (ⓓ in Figure 3) in the Articulation phase, it considers the current dialogue (ⓙ in Figure 3) and other contexts (ⓔ in Figure 3), along with the analysis results on troubles and missing content (ⓗ in Figure 3). If the current events involve troubles, the questions focus on *why* it occurred; otherwise, they focus on *how* it unfolded. The AI questions are typically open-ended or phrased to provide options verbally (*e.g.*, "`How did you use the Oliver eraser? Did you just erase it quickly, or did you do something else too?`"), but when asking about emotions, considering autistic adolescents' common challenge to express emotions explicitly [58], the system presents a list of buttons for 12 emotions to choose from: *joyful, glad, happy, excited, sad, angry, upset, scared, afraid, surprised, amazed,* and *bored.* This set is a subset of Plutchik's Wheel of Emotion [81], curated in consultation with one author—an autism expert—to exclude emotions that are rarely understood by autistic youth.

After receiving the adolescent's response, the **Description Reconstructor** (ⓚ in Figure 3) updates the panel description using the latest question-answer pair (ⓙ in Figure 3) and the analysis results on panel order (ⓗ in Figure 3). It first rearranges panel elements to ensure chronological consistency, then integrates new content into the appropriate panel based on narrative flow. Finally, it performs sentence cleanup and tense normalization to ensure that all content is in grammatically correct first-person past tense.

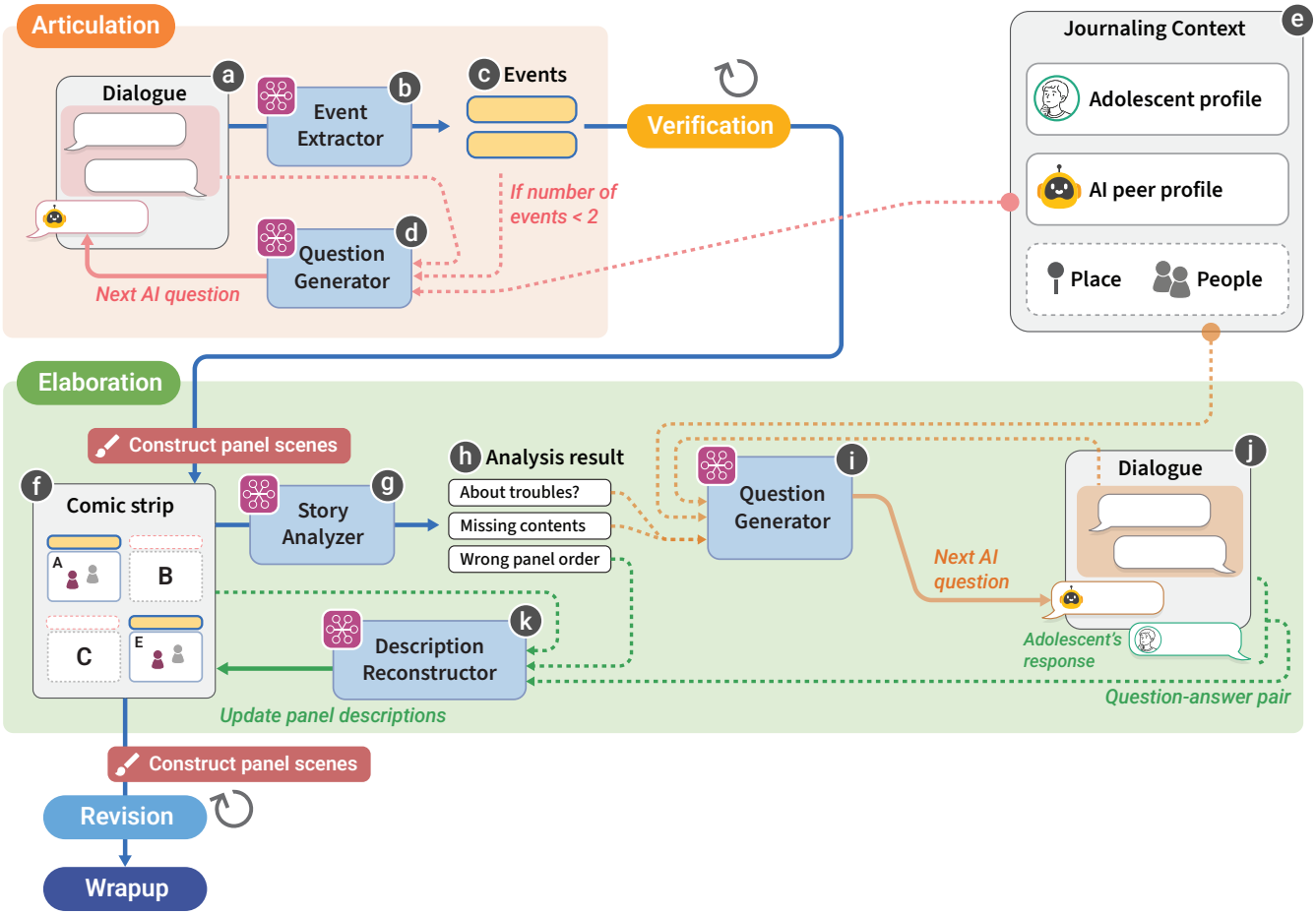

Figure 3: Generative pipeline flows of AUTIVERSE. In the Articulation phase, the ⓑ Event Extractor identifies ⓒ events from the ⓐ dialogue. If fewer than two events are found, the ⓓ Question Generator formulates a follow-up question. The process then moves to the Verification phase, which applies user modifications to the preliminary descriptions. After constructing panel scenes based on these descriptions, the Elaboration phase begins, iteratively updating the ⓕ panel descriptions. In this loop, the ⓖ Story Analyzer checks the descriptions for issues, and ⓗ its results guide the ⓘ Question Generator to ask for more details. The user's response, captured in the ⓙ dialogue, is used by the ⓚ Description Reconstructor to update the panel descriptions. Finally, after the panel scenes are constructed once more, the process concludes with the Revision and Wrapup phases.

4.3.3 Applying Modifications and Wrapping Up. In the Verification phase and the Revision phase, adolescents can revise the generated panel descriptions by verbally requesting modifications (*e.g.*, correcting or adding details). The system, in response, incorporates these changes into the corresponding panel descriptions.

When the adolescent confirms that no further revisions are necessary in the Revision phase, the process advances to the Wrapup phase, which finalizes the journaling. This phase executes two sequential generative pipelines based on the final panel description: (1) the system generates a warm and personalized response to the adolescent, providing encouragement and emotional closure; and subsequently (2) proposes three candidate titles designed to be emotionally resonant and contextually appropriate, thereby concluding the journaling process with a title.

4.3.4 Constructing Panel Scenes. Visual scenes of the panels are initially generated at the beginning of the Elaboration phase and are kept updated during the Revision phase (see in Figure 3). Figure 4 illustrates the generative process of constructing scene information from the panel descriptions. The scenes are represented in a parametric JSON format, so the pipeline incorporates only text generation. Receiving panel descriptions (ⓐ in Figure 4), the **Element Extractor** (1 in Figure 4) identifies essential elements in each panel (ⓑ in Figure 4): actors along with associated attributes (actions, dialogue lines, thoughts, and emotions); objects or concepts (*e.g.*, 'ball', 'eraser', 'cooking'); and the settings (*e.g.*, 'Classroom'). From this information, the **Topology Calculator** (2 in Figure 4) formulates the adjacency relationship among actors, objects, and concepts, for example, imposing the constraint that 'Oliver' and

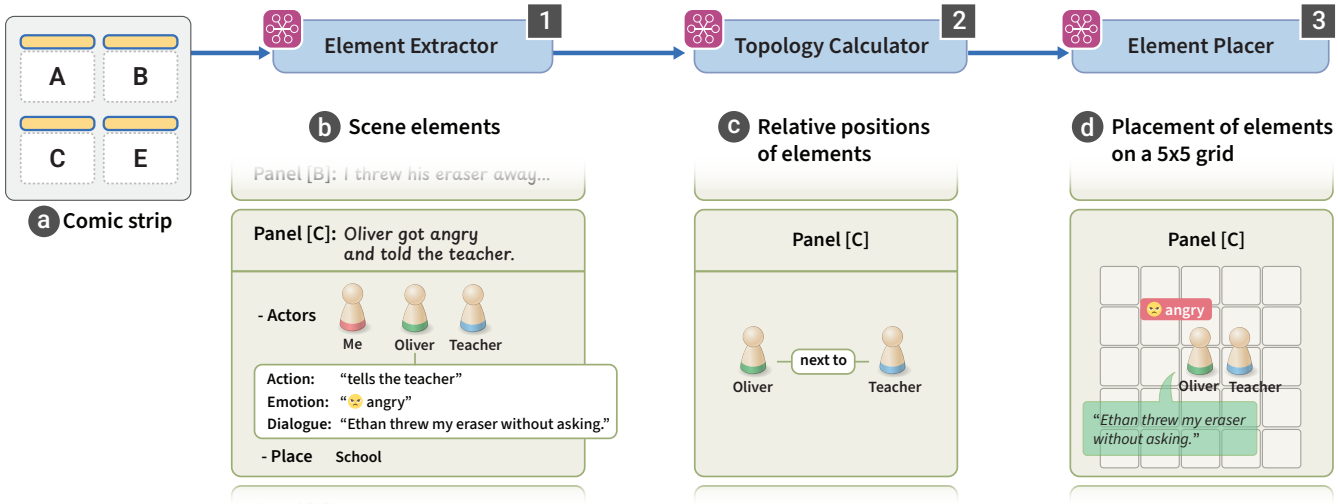

Figure 4: Generative pipeline for constructing panel scenes. The 1 Element Extractor first identifies ⓑ scene elements from ⓐ each panel description. Then the 2 Topology Calculator determines ⓒ their relative positions of elements. Finally, the 3 Element Placer generates the ⓓ placement of these elements on a 5×5 grid to complete the scene.

'Teacher' should be placed side by side (ⓒ in Figure 4). Finally, the **Element Placer** (3 in Figure 4) determines the actual coordinates of each element on a 5×5 grid in accordance with these relationships. Actors' attributes such as dialogue lines and emotions are rendered on the client side in close proximity to the corresponding actors (ⓓ in Figure 4).

4.4 Implementation

We implemented the core system of AUTIVERSE in Python using a FastAPI [30] server that serves REST APIs. The generative pipelines incorporate OpenAI [74]'s ChatCompletion APIs to run the underlying LLM inferences. We used `gpt-4.1-mini-2025-04-14` model for generative tasks. The panel progress and conversation logs were stored in the PostgreSQL database.

The client tablet app was implemented in TypeScript [69] on React Native [68] as a cross-platform app running on both iPad and Android tablets. The client communicates with the server via REST API. On user turns, the utterance is audio-recorded and sent to the server. The recording is then transcribed using CLOVA Speech Recognition API[3], which is widely applied to Korean automatic speech recognition. On AI turns, we used CLOVA Voice API[4] to generate AI's voice for the corresponding utterance.

5 Deployment Study

We conducted a two-week field deployment study with 10 dyads of autistic adolescents and their parents. We aimed to examine how AUTIVERSE supports autistic adolescents to organize their daily experience and how the use of AUTIVERSE influences both adolescents and parents in perceptions and conversation patterns. Here, we involved parents in two primary roles. First, to ensure safety while respecting adolescents' autonomy, we positioned parents as supportive observers, as mentioned in DR3. Second, to address the challenges that autistic individuals can face with self-reporting and articulating their experiences in detail [20, 48], we engaged parents as primary informants. This methodology allowed us to gather rich, interpretative data from their recollections of their child's experience, which served as our main data source, complemented by the direct feedback adolescents provided in the exit survey. The study protocol and materials were approved by the Institutional Review Board (IRB).

5.1 Participants

We recruited autistic adolescent–parent dyads by advertising our study, distributing flyers to online communities of parents with autistic children, through a child development center in South Korea, where one of the authors is affiliated, and through snowball sampling. We established specific inclusion criteria to ensure the appropriateness and feasibility of participation. For adolescents, the criteria included: (1) a diagnosis of Autism Spectrum Disorder, classified as Level 1 (formerly referred to as high-functioning autism) under CDC guidelines, (2) the ability to express their thoughts and understand others' speech without major difficulty, albeit with persistent challenges in sustaining everyday conversations, and (3) no significant motor impairments, particularly in hand coordination, allowing for independent interaction with a touchscreen tablet. We restricted the participant age range to 10–17 years to align with early-middle adolescence (10–13 and 14–17) as defined in pediatric guidelines [5], and within the WHO definition of adolescence (10–19) [110]. For families, we required: (1) one parent who could consistently accompany the adolescent during the two-week study as a supportive safeguard, and (2) access to a stable home Wi-Fi connection.

[3] https://api.ncloud-docs.com/docs/en/ai-naver-clovaspeechrecognition
[4] https://api.ncloud-docs.com/docs/en/ai-naver-clovavoice

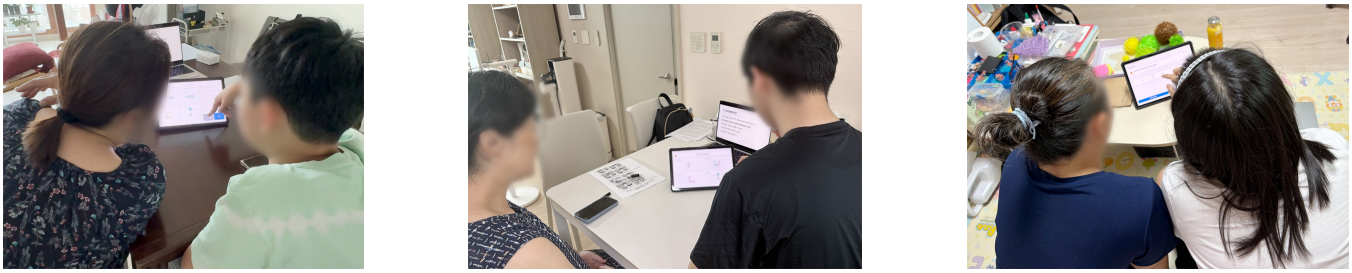

Figure 5: Parents and autistic adolescent participants are engaging in Autiverse during the introductory session.

A total of 16 dyads expressed interest in participation. To minimize the risk of cognitive or emotional distress, we implemented two screening steps. First, we asked parents to submit written descriptions of their child's communication level and intelligence quotient (IQ). An autism expert reviewed these descriptions and IQ to assess system fit and flag potential concerns. Second, we shared a demo video illustrating Autiverse's interface and interaction flow and requested parent feedback regarding its usability for their child. After this process, two parents decided not to participate in the study. Furthermore, four dyads were excluded as they did not live in proximity to our institution, a requirement for the in-person delivery and setup of the study equipment.

Ultimately, 10 dyads (P1–10, C1–10; the same number indicates a parent–child pair) provided written informed consent and participated in the study, with no dropouts. While the initial screening questionnaires were primarily designed to target potential parent participants who aligned with IRB requirements, we also asked parents to confirm their child's willingness to participate. Table 1 summarizes participant demographics, including the adolescents' communication characteristics as reported by their parents. The adolescent participants' ages ranged from 11 to 17 years ($M = 13.3$); seven were male and three were female. The parent participants' ages ranged from 45 to 56 ($M = 49.4$); all were mothers who identified as the primary caregiver. As compensation for their participation, we offered 250,000 KRW (approximately 182 USD) to each dyad.

5.2 Procedure

Our two-week deployment study consisted of four phases: (1) pre-study preparation, (2) introductory session, (3) deployment, and (4) debriefing.

Pre-study Preparation. Before the study, we collected information through an online survey, asking parents to share their child's daily routines (*e.g.*, locations visited and people encountered) and personal interests to be entered in the system. We also asked participants to optionally customize the AI agent's name, voice, and visual representation. (We shared a link to CLOVA Voice[5] where the dyads could listen to the sample of 25 available voices.) These decisions were explicitly framed as the adolescent's choice to ensure alignment with their individual preferences. We then pre-configured the device and installed the Autiverse app in advance to minimize the time for the initial setup. As a study device, we distributed a Samsung Galaxy Tab S9 tablet, featuring an 11-inch AMOLED display with a resolution of 1600 × 2560 (274 PPI).

Introductory Session. One researcher visited each dyad's home to configure the tablet device, connect it to the home Wi-Fi, and ensure that all necessary setup steps were complete (see Figure 5). After explaining the goal of the study and the protocol, we obtained informed consent from both parents and adolescents. Then, both the parent and the autistic adolescent engaged in a pilot session, during which they freely created a sample journal entry using Autiverse to support participants in understanding how to use the system. For parents, we provided specific guidelines for the deployment period: First, they were instructed to maintain a supportive but non-intrusive stance—allowing the adolescent to engage independently with the AI peer embedded in Autiverse. Second, they were asked to refrain from intervening in the conversation unless the adolescent explicitly requested assistance or asked a question. Lastly, parents were advised to adopt a positive and patient attitude and to avoid negative expressions that might discourage their child's engagement. This guidance was designed to reinforce the adolescent's autonomy while preserving a sense of psychological safety.

The introductory session lasted approximately 40 minutes.

Deployment. From the day after the introductory session, participants began using Autiverse at home over a two-week period. To allow participants to implement a natural and accessible daily routine, we allowed adolescents to engage with Autiverse at any time of day with no restrictions on the topic of choice. We logged all interaction data, including the journal entries as well as the system's generated outputs and user responses.

Once a day, we sent a text reminder to parents at their preferred time. In the evening, if a journal entry has been recorded for the day, we asked parents to complete a brief survey reviewing the daily experience. The survey asked parents to rate the level of parental moderation to support their child on a 5-point Likert scale. The survey also asked whether Autiverse helped parents learn new aspects of the adolescents' daily events or emotions, and whether they engaged in positive follow-up interactions (*e.g.*, praise, additional questions) after journaling, all on 5-point Likert scales. Conditional open-ended items prompted elaboration on what the parents learned and how they assisted their child, if applicable.

Debriefing. The day after the 2-week deployment, we visited each household for a debriefing session in which we administered surveys to adolescents and parents and conducted a semi-structured

[5]https://www.ncloud.com/product/aiService/clovaVoice?lang=en

Table 1: Demographics of our participants in the deployment study, adolescents' communication characteristics reported by their parents based on [27], and regularly visited places and frequently interacted-with people entered in the system. Note that we report places and peoples in simplified categories by anonymizing them.

Parents		Autistic Adolescents												
Alias	Age	Alias	Age (Gender)	IQ	Communication characteristics									Regular Places and People
					1	2	3	4	5	6	7	8	9	
P1	45	C1	12 (Boy)	81								✓		• School, Welfare center, Swimming lesson, Community, Taekwondo class • Teachers (5), Friends (3)
P2	46	C2	12 (Girl)	78	✓	✓			✓		✓	✓		• School, center, home • Mother, father, grandmother, teachers (5)
P3	46	C3	11 (Girl)	70		✓				✓	✓		✓	• School, welfare center, autism clinic, group therapy, church, park • Mother, father, evangelist, teachers (6), friends (9)
P4	50	C4	13 (Boy)	61					✓	✓	✓		✓	• School, language center, after-school center, welfare center, cooking class, art class, clarinet class, drone class, badminton class, soccer club, bowling club • Mother, bowling club staff (3), teachers (12), friends (25)
P5	52	C5	13 (Boy)	63		✓					✓		✓	• School, developmental PE center, language center, cognitive center, after-school center, welfare center, badminton class, social skills class, cooking class, drone class, piano academy, art academy, sports club • Mother, father, teachers (14), friends (21)
P6	49	C6	14 (Boy)	71	✓	✓	✓				✓			• School, after-school center, PE class, badminton class, swimming class, piano lesson, art class, workbook study, SNPE exercise • Mother, teachers (14), friends (13)
P7	47	C7	13 (Boy)	67		✓		✓			✓		✓	• School, welfare center, English academy, badminton class, swimming class, social skills PE class, art class, cooking class • Teachers (10), friends (14)
P8	54	C8	15 (Boy)	100	✓	✓	✓	✓		✓	✓			• School, game chatroom, hospital, church, apartment garden, home visit class • Mother, Aunt, Cousin, apartment resident (2), Teachers (7), friends (5)
P9	49	C9	13 (Boy)	78	✓	✓	✓				✓			• School, after-school class, group exercise class, development center • Mother, Teachers (4), friends (2)
P10	56	C10	17 (Girl)	101		✓	✓	✓	✓			✓		• School, counseling center, study room, art class, badminton class • Teachers (4), friends (2)

Communication Characteristics [27]

(1) Verbal and knows more words than just those used in their daily lives.
(2) Have also learned vocabulary from other sources (eg, reading, school, TV).
(3) More than just a functional vocabulary.
(4) Uses a variety of sentence types (simple to complex) and communicates opinions, ideas, news, events, aspirations.
(5) Might have significant difficulties in expressing ideas and feelings in words.
(6) Uses language to initiate and interact.
(7) Conversational difficulties might exist.
(8) Able to understand and use abstract language, but might have difficulty describing events in sequence.
(9) Can usually follow meaningful, simple, 3-step commands.

interview with parents. For adolescents, the exit survey comprised 11 items on a 5-point Likert scale: five adapted from the Technology Acceptance Model (TAM) [103], three about the four-panel comic (recall aid, ownership, autonomy), and two about the AI peer (friendliness, conversation quality). To support accessibility, each Likert point was paired with an emoji and a sentence label clarifying its meaning. We also asked which journaling method they preferred, offering several options with varying levels of AI collaboration.

We initially planned optional interviews for adolescents; however, because parents preferred non-face-to-face participation, we instead collected written responses to six open-ended questions in the exit survey from adolescents who opted in. The questions mainly addressed reasons behind their ratings (*e.g.*, intention to use, recall aid, friendliness, ownership, autonomy) and perceived differences between talking with a parent and the AI peer. Nine of the ten adolescents responded (all except C3).

For parents, the survey comprised 11 items: six TAM-based questions, two about the four-panel comic strip (content appropriateness, description coherence), and three about the AI peer (likability, facilitation of expression, conversation quality). Following the survey, parents participated in an hour-long interview with one researcher. The interview questions covered topics including their child's engagement with the app, their child's interactions with the AI peer and responses to the four-panel comic strip, the balance between parental involvement and their child's independence, observed changes in their child's expression, and parents' reflections on benefits, challenges, and desired improvements. All interviews were audio-recorded, anonymized, and transcribed for analysis.

5.3 Data Analysis

To characterize Autiverse usage patterns, we conducted descriptive analyses of the collected logs for journal entries, and for duration and the number of turns per entry and by each phase (a *turn* is a single exchanged message; *adolescent turns* are participant utterances and *system turns* are AI peer utterances). We also systematically coded the journal entries to analyze the distributions of key elements in terms of location, people, and activity. We then fit mixed-effects models [80] to daily survey ratings of parental moderation and parent–adolescent positive conversation for assessing trajectories over time.

For the qualitative component, we analyzed parents' daily survey and the debriefing interviews using open coding and Thematic Analysis [16]. The first author generated initial codes and candidate themes, and then the entire research team discussed any disagreements and iteratively revised the themes to consensus. Through our comprehensive qualitative analysis, we revealed the multifaceted impact of Autiverse on both adolescents and their parents, especially in terms of perceptions and conversations.

5.4 Safety Protocols for Adolescents

We implemented safety protocols for AI-guided journaling in accordance with our approved IRB guidelines. Each day during the two-week deployment, we reviewed the journal entries and the AI-adolescent exchanges to verify how the agent prompted and guided responses, screening for potential risks (*e.g.*, signals of distress, escalating conflict). If any such signals were observed, the first author would promptly engage the dyads and suspend the session. One of the co-authors, an autism expert and a certified youth counselor, served as a dedicated on-call counselor to provide immediate voice or video consultations. Where appropriate, a referral to a consulting psychiatrist for urgent care was also planned. Participants were informed in advance that they could stop journaling at any time, and a parent was present in a safeguard role during system use. In the two-week deployment period, no such event occurred.

6 Findings

In this section, we present key findings from our experimental study: (1) Overall system usage, (2) adolescents' narrative construction with Autiverse, (3) their interactions with AI peer, (4) the impact of Autiverse on parenting and parent-child interaction, and (5) participants' acceptance of Autiverse.

6.1 Overall System Usage

Over the two-week deployment period, adolescents actively engaged in journaling with Autiverse. Four out of 10 dyads used the system every single day, with no dyads skipping more than two consecutive days. Adolescents recorded a total of 122 journal entries, averaging 12.2 entries per adolescent (SD = 2.04; min = 10 [C1, C6, C8–9], max = 15 [C5]). Each session lasted 9 minutes and 43 seconds (SD = 4m 33s) on average and involved 46.92 conversational turns with the system (SD = 19.60), of which approximately 23 were adolescent turns. During the sessions, adolescents spent most of the time in the Elaboration phase (6m 17s with 25 turns) followed by the Revision phase (1m 11s with 6.6 turns).

Adolescents documented events at routine places in 68.03% of the entries, most commonly after-school classes (N = 40) and school (N = 25). In contrast, 31.97% of entries described events at non-routine places that had not been registered in the system. With respect to people, teachers (34.06%) most commonly appeared, followed by friends (29.71%) and family members (28.99%). Only nine entries (6.52%) incorporated solitary activities and one mentioned new acquaintances (0.72%). This indicates that pedagogical relationships (teachers) and peer interactions (friends) formed the core narrative contexts; events with social interaction were more likely to be subject to journaling than solitary activities.

From the activities described in the journal entries, we identified 13 activity types and grouped them into three high-level categories: *leisure*, *daily life*, and *special activities* (see Table 2). On average, each adolescent contributed to 6.34 unique activity types (SD = 1.69, min = 4 [C8], max = 10 [C2]). Almost half (46%) of the journal entries incorporated **Leisure** activities outside daily routines. Most adolescents frequently recorded **sports and physical activities**, ranging from physical education classes (*e.g.*, swimming, table tennis, taekwondo) to hobbies (*e.g.*, bowling, badminton). Half of the adolescents recorded **eating out**, typically emphasizing family bonding while dining together at restaurants. Hobby activities such as **artistic pursuits** and **video games** also appeared across multiple entries, covering activities such as taking music or art lessons, crafting something, or chatting with friends about a video game. Adolescents also recorded a broad range of routine activities from their **daily lives** in 34% of the entries. Six adolescents recorded **school activities** such as the excitement of the first day of the school semester and interactions with teachers or friends. **Domestic cooking and eating** with family or friends, engaging in **everyday activities** (*e.g.*, walking or spending time at home with family), and reflections and cases on one's **health**, were commonly recorded in this category. Some journal entries also described **social issues and conflicts** such as conflicts with friends and family. One fifth of the journal entries focused on **special activities**, rare and unusual events compared with everyday leisure. Most of these entries described **outings** (22 out of 24 entries), often involving external activities with friends or family, such as visiting amusement parks, attending musicals, or going on trips.

6.2 Constructing Narratives with Autiverse

Based on the survey results and the feedback in debriefing, we illustrate how Autiverse guided adolescents' narrative construction through scaffolding and multimodal support.

Stepwise Interaction Scaffolded Topic Selection and Narrative Construction. A majority of journaling sessions were guided by the scaffolds for selecting place and people. In 66.39% of journal entries (81/122), adolescents opted in the selection mode, whereas they chose an open-ended option, *I have something I want to write*, in 31.15% of the entries (38/122). Parents found the selection steps in the Preparation phase as highly supportive as a starting point for their child. Six parents emphasized that "*having clear options right in front of them really helped*" (P1). Parents unanimously recognized the effectiveness of the step-by-step questioning in the ABC-E format for advancing the story. P7 remarked, "*At first my child did not think concretely and just told things in his own way, but as he tried to answer the questions, he started to share more diverse, specific parts.*" Parents also noted that the composition of the ABC-E format helped their child grasp the essential structural pieces (*e.g.*, who did what with whom, what happened, and then what feelings followed) of the situation (P8) and organize the narrative in temporal order (P9). Most parents (P1, P4, P7–10) emphasized that the **Emotion** part was particularly beneficial, encouraging their child to revisit how they felt and why. P10 highlighted that this led to short but meaningful reflection: "*With a typical diary, my child might write, 'there was an event and I felt good.' But it[Autiverse] prompted her to think about what exactly triggered that feeling. [...] it prompted reflection on what the activities meant and how they made her feel.*"

Visual Support and Speech Interaction Facilitated Reflection and Expression. In the exit survey, adolescents rated the comic strip as helpful for recalling the daily events ($M = 4.5$, $SD = 0.71$; see Figure 6-ⓕ). They commented, for example, "*the drawing helped me think*" (C1) and "*seeing the drawing made it easier to understand*" (C5). Parents' observations supported this finding; eight of them reported that the comic strip served as an effective memory cue, helping children recall and elaborate on details. P2 remarked, "*My child is not yet a fluent reader, so seeing the panels made it easier to recall and answer.*"

Adolescents also expressed positive attitudes towards the voice modality, with seven (C1, C3–7, C10) indicating a preference for 'dialog-based comic journaling as currently implemented' other than 'self-writing with AI-generated drawings' ($N = 2$) or 'fully independent' ($N = 1$). Similarly, parents recognized that the voice-driven conversational modality was "*more accessible than writing*" (P1), and two parents (P2, P5) noted that the method encourages verbalization and externalization of adolescents' thoughts. P5 explained, "*When the transcribed words came out wrong, he swallowed and then tried to articulate more precisely, which seemed better for language development. With handwriting, a child can erase and tweak silently, but here the words have to be formed in the mind and produced aloud. Even if he hesitated, I could see him think again and try to fill the gaps, which I found very positive.*"

Table 2: Three topic categories and 13 activity types, number of journal entries and adolescent participants, and example titles from journal entries.

Categories	Activity types	Journal count	Participants	Journals
Leisure 56 (46%)	Sports & physical activities	29 (23.77%)	8	*Joy of a Successful Bowling Turkey* - C4 *Fun with Badminton* - C5
	Eating out	10 (8.20%)	5	*Buffet with Mom and Dad* - C2 *Ate Pasta with Mom* - C7
	Artistic pursuits	9 (7.38%)	5	*Making a Cloud Slime* - C2 *[Adolescent]'s Clarinet Practice* - C4
	Playing video games	8 (6.56%)	5	*Playing Brawl Stars with [Friend]* - C1 *Shooting Game with [Friend]* - C8
Daily Life 42 (34%)	School activities	12 (9.84%)	6	*Excited on the First Day of School* - C3 *Story from [Teacher]'s Class* - C10
	Domestic cooking/eating	8 (6.56%)	6	*Happy Family Dinner Time* - C7 *Making Shaved Ice with [Friend]* - C4
	Daily activities	7 (5.74%)	6	*Walk with Mom* - C10 *Happy Movie Time with Dad (At Home)* - C7
	Health and well-being	5 (4.10%)	3	*Went to Hospital for Stomachache* - C8 *[Adolescent]'s Sick Day with a Cold* - C6
	Issues and conflicts	4 (3.28%)	3	*[Friend] Felt Upset* - C3 *Counseling with [Teacher]* - C10
	Learning	4 (3.28%)	3	*Korean Class with [Teacher]* - C9 *[Adolescent] Studying English* - C7
	Autism therapy	2 (1.64%)	2	*[Adolescent]'s Class at the Welfare Center* - C1
Special Activities 24 (20%)	Outings	22 (18.03%)	8	*Holiday Trip with [Friend]* - C6 *Fun Day at Amusement Park* - C5
	Competition	2 (1.64%)	2	*[Adolescent] Won a Prize* - C5

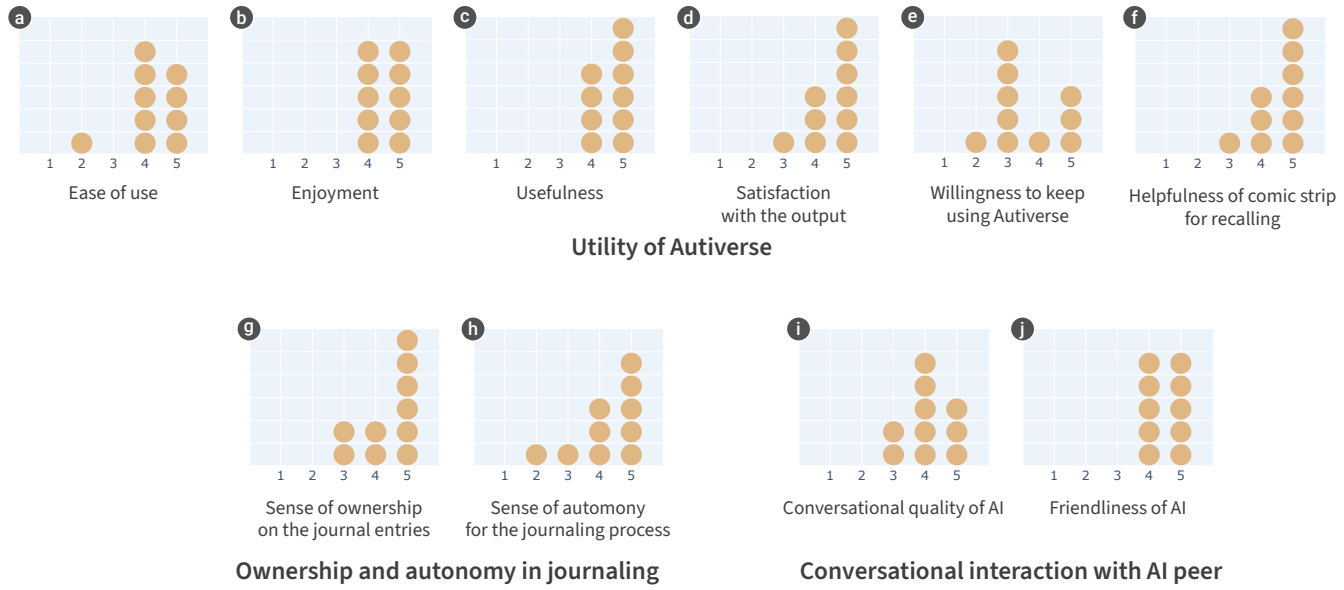

Figure 6: Distribution of adolescent participants' post-study ratings for (a) the technology acceptance model, (b) the four-panel comic strip, and (c) AI peer. Each circle represents the rating score of an individual adolescent participant. For all scales, a higher number indicates a more positive rating.

6.3 Adolescents' Engagement with and Perceptions of the AI Peer

We introduced a customizable, peer-like AI as a conversational partner to scaffold and guide journaling in Autiverse. Here, we report how the adolescents engaged with the AI peer in terms of customization and how they perceive it. As we incorporated significant AI guidance, we also investigated the sense of ownership and autonomy in the journaling process, as well as for the resulting journal entries.

Enthusiastic Customization of the AI Character. Eight adolescents (80%) heavily customized the AI peer's name, voice, and visual representation. The boys created a wide variety of characters: one *male character* (C1), one *photorealistic male* (C7), two *photorealistic females* (C5–6), and two *stylized characters*, including a cartoon hero with a male voice and an octopus character with a female voice (C4, C9). All girls create characters with a female voice: one *photorealistic female* (C3) and one *favorite bear character* (C10). In debriefing, parents suspected that the customization feature appeared to have reinforced their child's engagement. P5 described, "*We set the name to Thomas because my child liked it; [...] When the 'lovely friend' appeared and said, 'I'm Thomas,' my child just lit up and kept laughing—so the activity became more fun.*" P9 also remarked, " *If there had been nothing—just 'write'—it would have felt like homework, but having a favorite character made it feel different.*"

AI as a Companion. According to the exit survey, adolescents generally perceived the AI peer as a 'good friend' (M = 4.5, SD = 0.53; see Figure 6-ⓙ). They commented that the AI as "*kind and friendly*" (C1–2, C5, C10), with a "*pretty voice*" (C6) and "*cute appearance*" (C9). They further noted that it "*spoke well to me*" (C4) and "*understood well when I explained*" (C7). Some adolescents also emphasized that the AI had "*enough human-like psychological understanding to comfort me*" (C8), and "*avoided prying into sensitive counseling details*" (C10)—which contributed to making the interaction comfortable and non-intrusive. Parents, in turn, shared the impression that their child seemed to treat the AI as a real friend. For example, P3 noted, "*My daughter keeps asking whether [AI peer] is also in the fifth grade, and she says she wants to grow her bangs like [AI peer]'s.*"

Perceived Ownership and Autonomy in Collaborating with AI. According to the exit survey, most adolescents retained a strong sense of ownership over the journal entries, with a high rating for the item 'it felt entirely like my own journal' (M = 4.4, SD = 0.84; see Figure 6-ⓖ). The few participants who gave a moderate score of 3 expressed a sense of shared ownership with their AI peer. C8 commented: "*In the finished diary, I could see [AI peer]'s effort and process to understand and transcribe my answers; it felt like collaboration.*" Similarly, adolescents generally felt a high degree of autonomy, rating the item 'I could write it in the way I wanted' favorably (M = 4.2, SD = 1.03; see Figure 6-ⓗ). Exceptionally, C9 rated as not having a sense of autonomy, commenting "*Because the text and drawings did not turn out the way I wanted.*" This highlights that for some users, a high degree of perceived control and predictability over the final output is crucial for autonomy.

6.4 Parents' Perceived Impact of Autiverse

Based on the daily surveys for parents and the interviews, we explore how parents reflected on the tangible or potential changes that Autiverse introduced for their child and themselves.

Expanding Adolescents' Vocabulary and Narrative Expression. In debriefing, parents reported several key shifts in their child's patterns of conveying narratives over time when using Autiverse. They noted improved central coherence (P2, P4, P9), as narratives moved from list-like sequences to converging on a single topic (P9). Additionally, adolescents began to internalize the ABC-E format (P2–3, P6, P8), shaping responses to fit it and producing more specific stories (P8). The topics also expanded from familiar family situations to new episodes from school (P4, P10), and similarly, parents reported a broader emotional range, with their child expressing more nuanced feelings (P7, P10), such as 'confused' (P7) and 'proud' (P10).

Some parents reported noticeable changes in everyday conversations and expressed surprise. P7 pointed out "*In the last few days, my child explained situations more clearly. And when I misunderstood, he corrected himself—'not X, but Y'—in a way that felt like what the app had taught. In the past, he would have just said 'it was Y', but now he points out the part he wants to fix. I realized that what we did here is starting to show up little by little in daily life, and that he is applying it. Even though the time was short, I felt it helped.*" Other parents also described improvements such as more responsive answers to others' questions (P4) or longer conversations with more elaboration instead of one-word replies (P5).

Shifting towards Independent Journaling. The mixed effects model analysis of the daily survey revealed that the level of parental moderation significantly decreased ($p = 0.001^{**}$; see Figure 7) over time. In particular, eight parents responded that their child used Autiverse independently without explicit support (rating = 1) on at least one day. This suggests that as the adolescents became familiar with Autiverse, they demanded progressively less assistance from their parents to use it. P7 noted, "*Early on I intervened a lot, but midway through my child was taking over; toward the end it felt like the child was doing 90–100%.*" In some cases, this independence evolved into self-directed engagement, where adolescents began to take the initiative themselves (P4, P9–10). P4 remarked: "*I initially set alarms on purpose to remind and urge my child to journal. But as he came to enjoy it, he began seeking it[Autiverse] out and getting started on his own, which really surprised me.*"

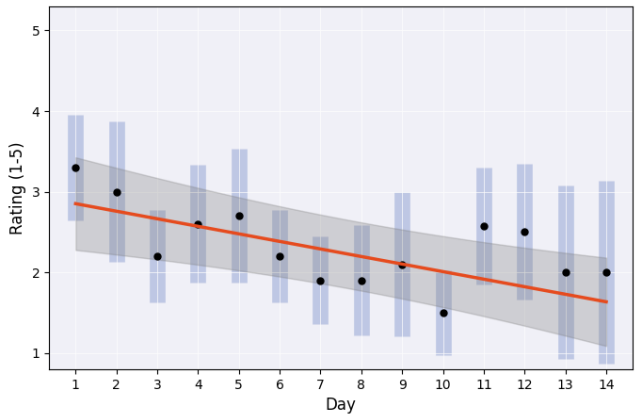

Figure 7: Daily trends in the estimated marginal means of parents' evaluation of the level of parental moderation during the journaling sessions over a 14-day period, after controlling for the random effect of individuals using mixed-effect models. The blue bars indicate the 95% confidence interval.

Enhancing Parental Awareness of their Child's Daily Experience. Our daily surveys captured the extent of new insights parents gained compared to what they already knew before reading the day's journal entries. Figure 8 illustrates the distributions of parents' daily responses by rating category. For both event-related insights (from the ABC panels) and emotion-related insights (from the E panels), parents reported gaining new insights on most days. As most of our parent participants accompanied their child to after-school activities and regularly received updates from school teachers, they were already familiar with many aspects of their child's daily events. However, parents noted that Autiverse still uncovered previously unknown details about their child's specific daily events and emotions. For instance, P6 discovered that her child's anxiety had led him to slam and break a keyboard, while P5 learned that a seemingly fun trip to an amusement park had actually been a frightening experience. Parents also learned entirely new information that would not surface otherwise. P8 mentioned "*It was nice to hear naturally whether my child was doing well, eating properly, and what happened at school because those are times and spaces I cannot see.*"

Fostering Parent-Adolescent Conversations. In daily surveys, parents reported that they had positive interactions with their child regarding Autiverse ($M = 3.99$, $SD = 0.91$). Parents reported in the debriefing that sharing daily journal entries helped them (1) initiate everyday talk, (2) hold joint attention for deeper discussion, and (3) provide timely empathy and praise for their child. Five parents (P1–3, P8, P10) remarked that Autiverse inspired everyday conversation topics for them to talk about their child's daily experience: "*Having this[Autiverse] gave us a topic, we spent more time talking about it together. My child used to talk only about games, so it was nice that we could also talk about everyday life.*" (P2). Further, Autiverse provoked deeper conversations so that they can "*sit a bit longer and talk more deeply about the day*" (P5). Two parents noted that the visual stories in Autiverse helped them recognize opportunities to praise their child's effort and respond warmly. P9 described, "*we use it as a tool to give that kind of praise like 'You must have been tired from attending the class, but well done' or 'Your writing has gotten much longer than before. Nice job.'*"

6.5 User Acceptance of Autiverse

Adolescent participants rated Autiverse favorably in the exit surveys, with scores of 4.2 ($SD = 0.92$) for ease of use, 4.5 ($SD = 0.53$) for enjoyment of use, 4.6 ($SD = 0.52$) for the system's usefulness in recounting today's events, and 4.5 ($SD = 0.71$) for the likability of the completed comic strip (see Figure 6, ⓐ–ⓓ). In contrast, they gave mixed ratings regarding their willingness to keep using Autiverse (intention to use, Figure 6-ⓔ). Adolescents who rated as

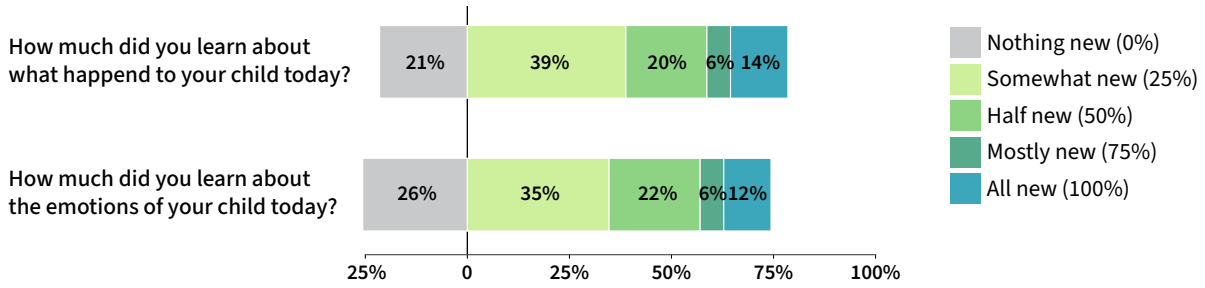

Figure 8: Distribution of parents' daily responses regarding the extent of new insights they gained about their child's daily events and emotions through Autiverse.

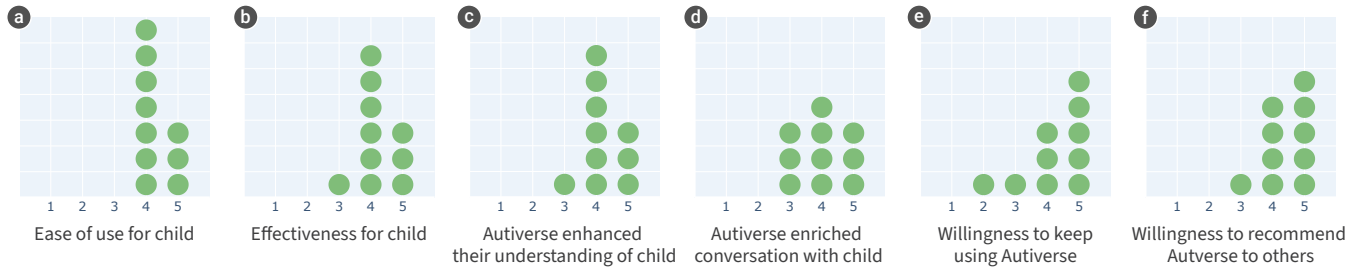

Figure 9: Distribution of parents' post-study ratings for utilities and benefits of Autiverse. The x-axis denotes 5-point Likert scale ratings and each circle represents an individual parent, stacked along the y-axis. For all scales, the high number indicates a more positive rating.

2 ('not really willing') or 3 ('not sure') expressed resistance to the act of diary keeping itself (*e.g.*, "*It's fun, but I don't like writing a diary*"- C1) or reported anticipatory anxiety and insecurity about its adoption (*e.g.*, "*If I keep doing it, there might be times when it feels hard.*"- C2), aligned with autism-related anxiety context [102].

Parent participants also showed high acceptance of Autiverse (see Figure 9). According to the exit survey, they perceived Autiverse as easy for their child to use ($M = 4.3$, $SD = 0.48$), effective for helping the child express experiences and emotions ($M = 4.2$, $SD = 0.63$), and helping them understand the child's thinking better ($M = 4.2$, $SD = 0.63$). They also felt it enriched parent–adolescent conversations ($M = 4.0$, $SD = 0.82$). Lastly, parents expressed high willingness to adopt Autiverse ($M = 4.2$, $SD = 1.03$) as well as to recommend Autiverse to other parents ($M = 4.4$, $SD = 0.70$). Motivated by their participation in this study, three parents expressed their intention to continue the journaling activity afterwards, with P2 already having put it into practice: "*This became the trigger for us to write a journal every day! So last Saturday, we bought a bunch of stickers, since my child said she wanted to write while sticking on various characters and objects.*"

7 Discussions

In this section, we reflect on how scaffolded narrative construction with multimodal AI can support autistic adolescents' journaling. We further discuss balancing parental control with data-driven guidance, benefits and challenges of designing an AI peer, and the design for the coming-of-age transition from the primary caregiver. We conclude with limitations of our work and outlining directions for future research.

7.1 Scaffolded Narrative Construction with Multimodal AI for Autistic Adolescents

Our findings demonstrate that Autiverse effectively supported autistic adolescents in narrating their daily experiences by scaffolding the journaling process. Initial scaffolds, such as selecting a location and people, addressed the common challenge of deciding what to talk about due to executive dysfunction in autism [41]. Step-by-step, question-based approach also mitigated the cognitive load of journaling by breaking the narrative process into manageable questions [79], enabling users to populate the ABC-E format successfully. This format, in turn, clarifies the essential narrative elements and supports the chronological organization of experiences. The final step, identifying an emotion (E), was particularly effective, prompting users to connect feelings to specific events, thereby fostering metacognitive skills and emotional awareness [22, 56].

The study also underscores the importance of multimodal flexibility. Autiverse leveraged different modalities to complement autistic adolescents' strengths and accommodate their situational needs. The comic strip's visuals acted as memory cues, aligning with the visual processing strengths in autism [53, 85, 86]. Voice interaction was also valued for its accessibility and offered collateral benefit for speech articulation practice, which aligned with voice application studies [87]. Furthermore, the optional typing function served as a fallback, ensuring user agency and task completion when speech recognition failed or when privacy was desired. This

demonstrates how providing multiple interaction pathways can build the foundation for inclusive and resilient systems.

While the study period was brief, the findings demonstrated the potential for skills learned in Autiverse to blend into everyday conversations. Along with in-system changes, parents reported notable improvements in their child's narrative coherence, elaboration, and responsiveness outside of system use. This suggests that the structured practice may equip adolescents with transferable tools for social communication. However, these results are preliminary and based on parent reports within a two-week period. Future work should validate these findings through longitudinal studies, employing more objective measures to assess social communication growth and understand the long-term impact of such narrative tools for autistic adolescents.

7.2 Balancing Parental Control and Data-Driven Guidance in Adaptive Scaffolding

Given the cognitive diversity of autism [61], parents emphasized the need for adaptive scaffolding. They envisioned starting with simple narrative structures and progressively introducing more complex demands as their child's abilities grew. For instance, P8 initially noted that her child grasped the basics of narrative construction, but later observed that "*the app's demands are relatively simple, so he is losing interest*" as his skills outgrew the static difficulty level. This illustrates the demand for a system that can evolve from basic interactions to richer, more probing conversational exchanges or a broader range of emotions.

Crucially, parents expressed a desire to control this progression themselves, tailoring the system's complexity to their child's perceived readiness. However, placing full control in the hands of parents can introduce potential challenges. While parents possess invaluable contextual knowledge of their child, their subjective judgments, shaped by specific contexts (*e.g.*, home interactions), may not fully capture their child's capabilities [23, 99]. Indeed, P4 noted, "*I used to think [child] was uncomfortable talking about himself, but he talked so easily with the [AI peer], which I found really interesting. [...] it made me think, 'Oh, that's probably how he talks at school.'*" This reveals a telling example that a parent might misinterpret situational reticence as a fundamental lack of ability and set the difficulty level too low, turning a supportive tool into a barrier, constraining the adolescent's potential.

Therefore, future systems should consider a balanced approach to adaptation. While parental control plays a vital role in personalization, it should be augmented with objective, data-driven recommendations based on the adolescent's actual performance. By analyzing metrics (*e.g.*, vocabulary use, sentence complexity, the variety of emotions expressed), the system can suggest when to introduce new challenges. This hybrid model, combining parental insight with data-driven suggestions, could create a truly adaptive and effective learning environment that can dynamically meet each adolescent's unique and evolving needs.

7.3 Benefits and Challenges in Designing Peer AI

Prior work showed that autistic adolescents can react defensively to perceived 'attempt to teach' from parents or therapists, a dynamic that often hinders educational goals [29, 76]. Our findings demonstrate how an AI peer can effectively work around this challenge by positioning as a collaborative, non-didactic partner. This peer-framed design shifted the locus of control to the users; instead of giving directives, the AI peer prompted and built upon their narratives. Customization options also affected their perception of the AI peer. As a result, participants not only enjoyed the interaction but also disclosed more personal stories to the AI than they would to their parents, perceiving it as a good friend. This highlights the unique value of AI peers as non-intrusive facilitators that can accompany narrative practice without imposing the burden of being taught.

While effective, it raises a critical question about the delicate balance of relational positioning between adolescents and AI. On the one hand, as the parent participants suggested, the personalized AI with long-term memory can be a close and trusted friend for adolescents. Its ability to create a meaningful connection has the potential to approximate the role of a 'friend who understands,' which is common in long-term human-computer relationships [11]. In fact, some perceived the AI as a safe companion that is more reliable and less risky than arbitrary peers who might misinterpret or stigmatize. On the other hand, the very success of this simulated friendship raises concerns that an AI peer could be seen as a complete substitute for human connection, a role it cannot and should not fill [75]. This presents a key design challenge about how to create sufficient relational depth to support meaningful narrative practice while simultaneously making the limits of this substitution transparent.

To navigate this tension, we propose positioning the AI peer not as a replacement for real-world friendship, but rather as a scaffold for rehearsing social skills. In this role, the AI acts as a low-stakes practice partner, offering a safe space where adolescents can experiment with self-expression and learn conversational rhythms in a non-judgmental environment. This process can lead to building the confidence and skills they can carry back into human interactions. By carefully framing the AI peer as a supportive yet not-human-replacing peer, the AI may achieve offering adolescents both safety and agency in their developmental journeys.

7.4 Designing for the Coming-of-Age Transition from the Primary Caregiver

While Autiverse was designed to be fully usable by adolescents on their own, our study deliberately positioned parents as observers to act as a safeguard. Within this protected environment, we found that 80% of adolescent participants engaged with the system without any parental assistance on at least one day. Notably, this independence often evolved into a more profound, self-directed engagement, where some adolescents transitioned from being reminded to proactively initiating on their own. This phenomenon strongly aligns with established developmental theories on autonomy and individuation in adolescence [14, 57, 97], which highlight the importance of self-directed engagement. This finding revealed two

critical design opportunities for supporting the transitional period when adolescents move from caregiver-centered interactions to broader social engagement.

First, the AI can serve as a confidential sanctuary (*i.e.*, a secret diary) where adolescents can articulate thoughts that they might not share with others. This private space enables unfiltered self-reflection and emotional processing without fear of judgment, which is invaluable for navigating complex feelings and social experiences [1, 63]. However, this raises ethical challenges of generative AI: the inherent unpredictability of LLMs that we cannot guarantee their responses will always align with our intended supportive goals [6, 108] and the risk of over-reliance, which can lead to privacy issues [111]. To mitigate this, we propose active, internal guardrails, including a supervisory AI model to validate responses against safety protocols (*c.f.*, [52, 91]), and a dynamic analysis module to detect early signs of over-reliance. This module can gently reinforce the AI's role as a supportive tool, rather than a sentient friend, thereby protecting adolescents and fostering parental trust.

Second, it is also necessary to design a systemic component, intentionally built to support both the care-receiving adolescent and the care-giving parents. This requires moving beyond providing unilateral insights—which can feel like covert monitoring—and instead exploring how to facilitate effective, adolescent-led sharing. The goal would be to encourage meaningful dialogues based on what the adolescent chooses to share, rather than what is passively gathered. This, however, introduces a significant design challenge: how to calibrate the balance between giving parents enough context for empathy and rigorously protecting the adolescent's privacy and autonomy, especially during their natural individuation [96, 97]. Therefore, the ultimate discussion should not be merely about connecting parent and child, but about thoughtfully designing a balanced interaction that supports this healthy, necessary separation and benefits both.

7.5 Limitations and Future Work

Our study has several limitations that could impact the generalization of the findings. First, our study utilized an LLM predominantly trained on Western languages to support autistic adolescents in a Korean context. While the AI's outputs were comprehensible to participants, we observed that LLMs took longer to generate responses due to inefficiencies in tokenizing Korean compared to English [2]. This highlights an opportunity for future work to employ an LLM specifically fine-tuned on the Korean language and culture to enhance system responsiveness, potentially leading to greater user engagement.

Second, although we aimed for diversity (*e.g.*, adolescents' gender, age, communication characteristics), all participants were residents of South Korea, a country with high AI adoption [44]. Furthermore, while our study with 10 autistic adolescents revealed promising opportunities for Autiverse, this cohort may not be representative of the entire autism spectrum. Therefore, future research with a more diverse population—varying in socio-cultural context, AI literacy, and representation across the autism spectrum—would be valuable for exploring the system's broader applicability and uncovering different use patterns.

Lastly, our reward-based feature was limited to a simple mechanism of awarding three stamps, lacking more sophisticated mechanics. During the debriefing interview, parents reported that their child particularly enjoyed the popping animation of the stamps. However, they emphasized that more game-like elements, such as scores or rankings, would be crucial for substantially boosting their child's long-term engagement. Therefore, future work should focus on designing and integrating these advanced gamification features to create a more compelling and sustainable user experience.

8 Conclusion

In this paper, we designed Autiverse to support narrative construction for autistic adolescents through journaling with multimodal AI. Drawing on formative interviews with professionals and parents of autistic adolescents, Autiverse leverages a peer-like AI that elicits key details in ABC-E format via stepwise dialogue and transforms them into an editable four-panel comic strip. In a two-week deployment with 10 adolescent–parent dyads, Autiverse proved to be a feasible and effective tool for helping adolescents organize experiences and emotions into more coherent narratives and created a comfortable, enjoyable space for sharing. Parents reported learning additional details that often go unnoticed in routine conversations, enabling more meaningful follow-ups at home. Together, these findings highlight the promise of combining conversational prompts with visual supports to lower the executive burden of journaling without compromising autonomy. We believe the contributions of this work lay ground for future tools that will augment autistic adolescents' strengths and help bridge communicative gaps between neurodiverse and neurotypical communities.

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