Emotional Entanglements and Emotional Sustainability in HRI

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Abstract

Human-Robot Interaction (HRI) research in real-world settings may lead to unanticipated, emotionally charged moments. While impacts of these moments on participants are reported in the literature, researchers' emotions, which can affect participants' experiences, are often left unreported. Learning from these moments is essential for advancing HRI quality and real-world deployment success. We introduce *"Emotional Entanglements"* as a lens in HRI to define a researcher's capacity to anticipate, absorb, respond to, and recover from emotionally impactful events. Collecting testimonials using *collaborative autoethnography* from eleven researchers, we surface recurring *emotional entanglements* experienced in HRI studies, including tears with mixed meaning, participant attachment and loss upon robot withdrawal, and consequential participant decisions attributed to the robot, as well as how researchers navigated them amidst protocol constraints. This paper provides an actionable guide to *"Emotional Sustainability in HRI"*, raising awareness of these often unreported situations and offering strategies for mitigation.

CCS Concepts

• **Human-centered computing** → *HCI theory, concepts and models*;
• **Computer systems organization** → **Robotics**.

Keywords

Emotions, Social Robots, HRI, Emotional Sustainability

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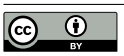

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1 Introduction

When social robots are placed in-the-wild, in homes, schools, hospitals, or care facilities, users do not simply interact with the technology; they live with it [44], evolving into part of the social fabric, integrated into users' routines and relationships [20, 33, 44]. However, these in-the-wild environments are dynamic, unstructured, and *messy* [53], often revealing unexpected moments between people and robots, making it challenging to follow scripted and standardized protocols. Since social robots are embodied, co-present, and appear agentic, people ascribe intentions and feelings to them. Putting them in-the-wild may trigger emotionaly charged reactions [11, 38, 61]. These reactions may cause logistical, ethical, and emotional challenges both for researchers and participants. While Human-Robot Interaction (HRI) has examined the social consequences on users' trust, bonding, companionship, therapeutic effects [34, 37, 38, 45, 62, 64], as well as participants' experience of attachment, grief or loss when robots are withdrawn at the end of research studies [20, 37–39, 45, 48, 52, 57, 62], there is limited literature on how researchers themselves deal with the emotional entanglements that arise from the study.

We extend related work in situational ethics and researcher well-being by proposing an **emotional entanglements (EEs) lens** for emotionally and ethically charged moments related to in-the-wild HRI. We operationalize this lens through a minimal reporting vocabulary and a reporting checklist that complements institutional ethics practices. Phases are used as analytic annotations (not prescriptive) that can repeat or overlap as studies evolve. Phases are a secondary tag indicating when an EE surfaced in the study lifecycle (before, during, end, post-study).

In-the-wild studies are emotionally challenging for researchers as they may encounter participants' reactions that researchers may not be prepared to mitigate, resulting in unpredictable consequences given the uncontrolled nature of the context. Researchers need ways to anticipate and actively respond to disruptions that technologies can cause [66]. Such moments and failures are under-reported in

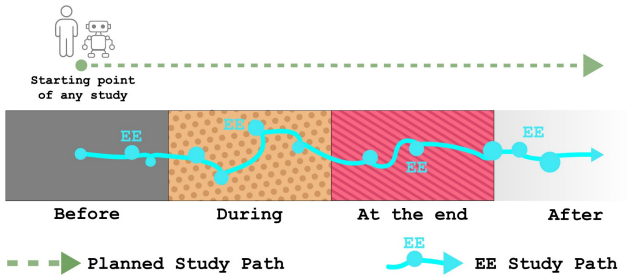

Figure 1: Emotional entanglements (EEs) across a study lifecycle (Before, During, End, After). The dashed green line depicts the planned study path, while the blue line illustrates how EEs can introduce deviations and "knots" as studies unfold in the wild.

HRI, motivating the HRI community to come together to curate case studies that did not go as planned [17, 30]. Our responsibility as HRI researchers and practitioners should be to ensure both participant and researcher well-being in emotionally entangled research studies [52]. To better understand entanglements, we report testimonials from eleven HRI researchers shedding light on emotionally challenging moments faced related to in-the-wild studies: emotional trigger points, improvised decisions, and consequences on participants, institutions, and research teams.

Our work is shaped by two guiding questions:

(1) When and how do emotionally entangled events emerge throughout the lifecycle of in-the-wild HRI studies?
(2) How do researchers navigate and feel the effects of emotionally entangled events?

We define **emotional entanglements (EEs)** *as a unit of analysis for HRI when relationships, obligations, and structural constraints between participants, researchers, stakeholders, institutions, and robot trajectories knot and force in-action choices across the study lifecycle, reframing "messy incidents" as analyzable events* (See Fig. 1). In line with work that understands emotion as situated [2, 21, 24], we treat these entanglements not as personal feelings but as signals of how institutional, social, and technical conditions intersect. We collected and analyzed testimonials of EEs: moments where studying HRI triggered a significant emotional response which can be positive or negative (e.g., joy or distress). Understanding these entanglements can improve the **Emotional Sustainability** of HRI research, *the capacity of researchers to anticipate, hold, and repair the **EEs** that arise, responding to ethically important moments with safeguards and shared responsibility, and protecting participants and researchers while preserving the integrity of relationships and studies* [26].

Our work contributes (1) a **reflexive account** of how HRI researchers navigate emotions, responsibilities, and methodological adjustments, (2) a **typology of emotional challenges** faced in HRI in-the-wild, centering researchers' first hand experiences; and (3) a **preliminary checklist and reporting template** to help researchers document and process emotional impacts.

2 Related Work

2.1 In-the-wild HRI and Ethics-in-action

HRI often demands careful, sustained attention to participants and their contexts [27, 68]. People frequently form social relationships with robots, ranging from seeking proximity and exhibiting separation distress [50] to responding to them as social others [62] and experiencing nuanced emotions like reminiscence [28] or place attachment [29]. This can be described by the phenomenon in "ecological psychology", which emphasizes the reciprocity between a perceiver and their environment [23, 40]. As such, robots, more than objects, are dynamic parts of the participant's situated experience. These tensions are not unique to robots. They are inherent properties of socio-technical deployments in-the-wild [59].

Unexpected emotions may arise during the study and also emerge toward its conclusion, a point emphasized in previous research. For example, scholars have noted how researchers should treat endings as a responsibility, distinguishing intervention exits (e.g., when a study ends) from situational exits (including painful or denied exits), and recommending user-directed exits through upfront planning, discussion with users, and continuity of use [5]. This reflects a shift toward a comprehensive future that explores uncertainty, centers human experience, and contests narrow narratives [54]. In Human-Computer Interaction (HCI), Wallace et al. foreground ongoingness, which means designing with people and technologies over time rather than treating deployments as endpoints, thereby informing a sustainability mindset for post-deployment continuity and care [65]. Although many tools have been developed, these remain team-facing, adaptable scaffolds, not community-wide, publicly shared repositories where cases and reports are visible and comparable across projects and contexts. Questions about how emotions unfold when robots enter, interact, and exit people's lives are becoming more frequent [3, 36, 38, 43, 55, 57, 58, 69].

Due to these unexpected circumstances, recent work in HCI advocates for open, transparent, and participatory ethics that involve all stakeholders, e.g., participants, end-users, creators, and researchers [49], shifting ethics from a one-time Institutional Review Board (IRB) approval to an ongoing and embedded process. Based on this work, Craig et al. created an ethical roadmap to rehearse dilemmas and support reflexive team self-awareness [10]. Driven by values such as safety, reliability, transparency, and human dignity [8], this shift is crucial and strengthens HRI research, development, and adoption [52]. Yet, anticipatory paper-based ethics are often insufficient for the turbulence of in-the-wild deployments. This calls for an **ethics-in-action approach**: a situated, ongoing, and responsive practice (e.g., [47]). Our work is one of the first to reflect on HRI researchers' emotional turbulence.

2.2 Researchers' Well-Being

The influence of researcher presence on data and on emotional and behavioral outcomes should be documented [31], especially focusing on how researchers engage with and reflect on moments when unexpected emotional entanglements occur—issues that are often reported less than the robot's behavior or the interactions between users. Furthermore, attending to researchers' well-being improves care for participants, reduces burnout and "quiet" withdrawal from sensitive contexts, and yields more honest reporting of what in-the-wild HRI entails [5, 32, 35, 52, 66, 67]. Within situated ethical practice, researcher well-being is underexplored, particularly in cases where sensitive work can spill into personal life, requiring support and boundaries, and EE can prompt hesitation,

under-reporting, and self-censorship that may affect data quality [35, 46, 51]. This signals the importance of developing usable guidelines, shared resources, and repositories for researchers' well-being, and cultivating an active community to navigate unexpected field events [19].

Researchers' reflection is important because researchers co-produce what happens during deployments, and such reflection should be treated as part of the method and the in-the-moment experience [22, 47, 67]. Although there are scholarly examples of documenting such unintended consequences and proposed routine ways to surface them, including case collection to facilitate reflection and brainstorming, increasing input from diverse stakeholders in research design, and creating explicit guidelines for evaluating societal impacts [13, 14, 41, 63], most articles omit researchers' reflections. This may be because of the academic environment that prioritizes fast-moving publications; it is often difficult to meaningfully engage with or address these responses [13]. Little is known about how emotional entanglements faced by researchers may lead to hesitation, intense positive or negative reactions, silent self-censorship, shape data quality, validity, and participation [46]. While institutional ethical reviews are mostly set up to protect participants [7] and universities, researcher well-being is underexplored.

Our work addresses this critical gap: exemplifying how researchers themselves engage with or reflect on these unexpected, emotional moments and utilize them to scaffold how future researchers can better anticipate and prepare for emotional entanglements.

3 Methodology

3.1 Collecting Autoethnographic Testimonials

We collected and analyzed testimonials of *emotional entanglement events (EEs)*: moments where studying human-robot interaction triggered a significant emotional response in participants, site staff, or researchers. We use the EE definitions introduced in Section 1 as our analytic lens throughout the study. We used collaborative autoethnographic and reflective methodology [1, 16, 60] to examine our experiences from past HRI studies in-the-wild. This methodology treats researchers' own experiences as data, affording room to describe, interpret, and claim them as valid knowledge based on testimonial sources [18]. Autoethnography is uniquely suited for this study as it enables self-reflection on HRI practices and surfaces the under-reported emotional dimensions often missed by traditional research methods and ethical protocols [18, 60]. This aligns with other studies which identified the strength of team reflections, such as debriefs, journaling, and shared check-ins, to support researchers' well-being and ethical awareness throughout a study [56].

To conduct this autoethnographic study, all eleven authors shared testimonials of their prior experiences conducting HRI studies (Table 1), reflecting on their interactions and decisions made in situ. We created a common template (See Supplementary Materials) to report emotional entanglements, one report per event, organized by phase (Before, During, End, After), to standardize our reports. For each entry, we captured what happened, who was involved, the rationale behind decisions, emotions from participants and researchers, and the strategies we used to handle the moment. These events were drawn from 15 different robot deployments, from 11 researchers, ranging from a single deployment to three years, and a range of participants. The cases are anonymized, but cite each researcher with a number between 1-11.

Table 1: De-identified corpus summary (n=15 deployments)

Populations	**Count**	**Contexts**	**Count**
Children (typical)	5	*Private / family homes*	5
Children w/ specific needs (Autism, Visual Impairment, Oncology)	3	*Schools / camps / public education*	4–5
Families / parents	3	*Hospitals / rehab clinics*	3
Older adults (dementia/Alzheimer's)	1	*Care homes / Assisted living*	3
Older adults (Typical)	2		
Adults w/ severe motor impairment	1		
Durations (binned)	**Count**	**Researchers' experience (years)**	**Count**
Single session	3	≤ 1	2
1 week	1	*2–4*	6
2–8 weeks	5	*5–9*	5
2–3 months	3	≥ 10	2
≥ 1 *year*	2		

To anchor our autoethnographic reports, each author revisited their prior studies, using contemporaneous notes, emails, published materials, and retrospective reflections. Where possible, we required two or more sources for factual details (e.g., dates/timelines) and used team debriefs to resolve discrepancies. We focused on emotional challenges that occurred at four key temporal phases across the study lifecycle: **Before the study:** Anticipatory hesitation or institutional concerns. **During the study:** Distress, tears, or boundary tensions. **At the end of the study:** Unexpected attachment and difficulty with robot removal. **After the study:** Lingering consequences or delayed emotional after-effects.

Each author documented the study context, phase, and details of the emotional event and the perceived emotional entanglements. The report captured key details like duration and direction of the emotion, as well as researchers' in-the-moment responses and any follow-up actions. Researchers then held joint discussions to identify commonalities and differences. This process allowed us to reflect on the robot's role, participants' reactions, and the researchers' own experiences in processing these situations. We report a total of 15 reflection events that triggered EEs. Table 1 shows contexts and durations, and Fig. 1 links EEs to study phases.

3.2 Researcher Positionality

Our team is interdisciplinary, with training across Computer Science, Cognitive Science, Psychology, Human–Computer Interaction, Interaction and Industrial Design, Human–Robot Interaction, Engineering, and Robotics. These backgrounds shape how we behave in the HRI field and how we respond to emotional events. We note this to situate our interpretations rather than to claim completeness across contexts. We write as reflexive practitioners who have repeatedly deployed robots in everyday settings and faced unpredictable relational and EEs that structured protocols and ethics approvals do not always anticipate. This autoethnographic study is a collaborative analysis of our own professional experiences; hence, no human subjects were recruited, and personally identifiable information of past participants is not reported. All studies in this

paper were reviewed by each author's local Institutional Review Board (IRB)/Research Ethics Committee (REC).

3.3 Thematic Reflection

The autoethnographic testimonials served as the empirical foundation for our collective thematic analysis. We used a digital whiteboard (Miro Board) to thematically cluster excerpts from each case. Our inductive, thematic clustering [6] process involved: (1) Open-coding emotionally significant moments, (2) organizing codes by temporal phase (before, during, end, after), (3) affinity diagrams to group recurring types of EEs within each phase, (4) identifying recurring themes and noting actions and after-effects. This yielded an EE-type typology, post hoc, four recurring needs: anticipation, in-the-moment stabilization/absorption, response at withdrawal/closure, and recovery/aftercare, that later informed the model we present in section 5.

4 Findings

We report six types of EEs that surfaced across our deployments, including those unreported in publications. We present EE types as the primary analytic contribution, and annotate where they most often appeared across the study lifecycle.

4.1 Gatekeeping and Uneven Expectations (Typically Before)

EEs existed before data collection properly began. Recruitment of participants and setup were marked by **EEs related to anticipation and hesitation, uneven expectations, entanglements with gatekeepers, and moments where ethics protocols (IRB/REC) did not fully anticipate field realities** (R1, R2, R3, R7, R10). In a telepresence study connecting a distant grandmother with her family, R1 and R2 planned a two-month in-home deployment. During IRB drafting, they anticipated attachment risk, because the participant lived alone and the robot would possibly be quite useful, so they redesigned the study as a two-week, multi-family trial and dropped the original plan. The change likely prevented a painful exit of the robot, but it also cut the study's longitudinal ambition before the first session. Early terminations of in-the-wild deployments may avoid anticipated EEs and protect participants momentarily; however, they limit learning opportunities for the community on how these situations unfold, thus shrinking the validity and generalizability of in-the-wild studies regarding deployment duration and fit within people's daily routines. *"These types of trade-offs are tricky because they generate mixed feelings. I feel relieved that we are protecting future participants' emotions and attachment. Still, I regret cutting a two-month longitudinal study ambition to two weeks, losing the chance to learn how the dynamics would have evolved routinely"* (R1). The consequence of such EEs was that the deployment was redesigned and shortened before it began, reducing longitudinal insight while avoiding anticipated attachment-related harm.

4.2 Safety, Distress, and Harm (Often During)

A case exposed EEs in the first session, when the very first participant, a child (5 years old), in the first session with the NAO robot, became frightened and started crying due to the initial movement and sound of the robot. The parent intervened, the child withdrew, and the study was put on hold. *"This was the first study of my PhD, and the first child of the study (...) initially I wasn't sure how to react. I was horrified (...), sad, confused, and anxious (...) that I had just made this poor child cry, especially as the long-term goal was to help children (...) I was then anxious about how I would resolve this issue"* (R7). Although the study protocol had IRB approval, the incident exposed a gap between paperwork, tools available, and practice. These EEs compelled R7 to create a familiarisation protocol for introducing robots that included slower motions, predictable sounds, and a graded, gentle introduction: *"it was a lesson I learned, which has influenced my practice since then. It is still something I reflect on and feel regret over. When starting a project looking at robots interacting with autistic children, familiarization methods were one of the first practical points I raised"* (R7).

In one case (R8), a child on the autism spectrum showed distress in a clinician-mediated interaction. Any sign of distress triggered a pause, comfort, and reassessment on the spot. Despite scaffolding from the therapist, distress recurred. The research team invoked a *no-harm* commitment and ended participation for that child: As the R8 put it, *"Because as researchers, we don't want to do any harm, nor seeing a child crying as a consequence of our experiment."* This situation led R8 to be *"Sad and worried about the child"*. The decision meant the research team *"... could not evaluate long-term cause, because she (the child) completely dropped out,"* acknowledging the trade-off between data completeness and participant well-being. R8 explained the ethical dilemma and inter-individual variability: *"everyone is different and the reaction that they have in the presence of the robot is never predictable. In-the-wild HRI is the only way to confirm if one likes a robot or not, and how such a feeling is connected to each person."* Similarly, R11 explained that: *"These experiences teach us that we cannot control every aspect of our research process (...) We can control the behavior of the robot (...) There is a human factor in our studies, which, in a way, is unpredictable. We cannot know exactly how children, teachers, or family, will behave."*

In a hospital study with children in oncology units, R4 described *"I observed that some researchers were emotionally affected by what they saw at the hospital (...) some researchers at my institution refused to participate (to conduct the study at the hospital) because it was likely to be necessary to go to the hospital (and face the children)."* Researchers sometimes avoided direct contact with the project's target group to prevent their emotional distress. They lacked the necessary training to handle EE effectively. The consequence of these EEs were prompted pauses, protocol changes, and participant dropout, and reduced planned data collection.

4.3 Technical Fails and Blame (Often During)

In-home deployments created EEs based on technology failure and logistical challenges. For example, a robot that powered on but failed to start (chipped SD card and network problems) produced *"...technical logistics issues that were not expected, thus both the participants and the researchers were confused and hoped that it would be resolved, but unfortunately after troubleshooting, they weren't resolved"* (R6), which led to *"the child being severely distressed and the parent desperate. It was a difficult decision to end the study (...) The family was sad but understanding."* Considering that researchers felt they are the front of responsibility when EEs happen, some

researchers expressed having *"...felt terrible because the moment we learned about it was when the parent called me and the child was yelling and crying in the background"* (R6). Families often self-blame, even when researchers accept responsibility; this emotional harm can persist. The choice to pause and fix the issue or continue with a faulty system put a significant emotional burden on the researchers and could erode trust with the participants. *"A demo effect is one thing, but the robot worked unpredictably and often, instead of reporting what the issue was, it responded with "I can't play with you right now, try again later"* (R10). These situations risked the data quality and the participants and communities trust: *"Relationship building is a lot of emotional labor (...) I was always worried about how the robot's inability to respond would reflect back on our lab's reputation and connections with families and organizations (...) This led to disengagement and disappointment (from the family and children)"* (R10). This left R10 feeling *"frustration, a bit of anger (...) I was anxious and disappointed that I was going to lose the connections I had developed"* (R10). **These accounts show how technical instability becomes social instability.** Robot glitches, delays, clouded sessions, or technical errors reconfigure the relationship between the robot, the participant, and the researcher. Asking families to wait while fixing or proceeding with an unstable system created moments of unsustainability. Technical EEs escalated into distress and reputational strain, sometimes ending deployments early and undermining trust and data quality.

4.4 Role & Boundary Tensions (Often During)

Role and boundary tensions often surfaced in real time during interaction (R1, R2, R4, R6, R8, R9, R10, R11). The dynamics in the field evolved quickly and was negotiated on the fly, *'very intense in a way I couldn't anticipate'* as described by R4. All these researchers reported that their participants cried in joy, relief, sadness, grief, or fear. This placed heavy emotional and ethical demands on researchers who felt speechless, happy, worried, guilty, and torn between comforting participants and staying neutral. *"Tears of grief and joy are hard to read in real time, and also, as a human, I wanted to support the participant who was crying, but as an interviewer, I did not want to oversteer or lead responses, so I became neutral and glacial and continued with the interview"* (R1). These moments exposed role conflict and, at times, ethical paralysis, where uncertainty about whether intervening would protect or derail the session. *"Having to remain methodologically neutral while a participant was tearing left me feeling torn, helpless, and guilty for not comforting, and second-guessing that choice long after the session, as if I proceeded correctly"* (R1). **Stakeholders often interpreted the same episode differently.** What was read as therapeutic to some, was read as risky to others. Additionally, pauses on studies were ad hoc, with unclear authority on who can or should pause the study. The researcher on site often made the call, carrying both the emotional burden and the practical costs to data and partnerships. Role conflict and interpretation mismatches of EEs shaped in-the-moment decisions, shifting how sessions unfolded and who carried responsibility.

EEs during studies were triggered by content and context. For example, in reminiscence activities in a care home specific for older adults with Alzheimer's, a robot for reminiscence therapy was being studied and co-developed (R1 and R2). The psychologist and occupational therapist suggested using common human memories, such as prompts about weddings and baptisms. These prompts helped people with Alzheimer's resurface past relationships, and two participants remembered and talked about their families, crying and sharing how much they care for them. The researcher, the psychologist, and the occupational therapist saw this event positively, as it meant that the person was still reacting emotionally to stimuli, and the intended goal of the robot, reminiscence, was being accomplished. However, the Institution's Clinic Director interpreted the residents' tears as a reputational and ethical risk for the care home, evaluating the EE event as unacceptable under current policies, and became concerned about how families and the general public might perceive it. Following this, R1 explained, *"I was caught between two readings of the same moment, and especially, I felt unprepared (...) The episode revealed a gap in our protocol. Neither the clinical director nor I knew the right next step when a robot triggered what looked to be crying out of nostalgia, based on reminiscence, and even having the support from the Psychologist"* (R1).

4.5 Attachment, Endings, and Continuity (End)

Although all studies end, our cases exemplify that **attachment and ending moments were rarely neutral and could persist beyond the deployment.** These EEs often appear in two main ways: scheduled withdrawal under a fixed protocol, and unscheduled termination by a third party or because of an unexpected event. Across contexts and with different age populations, several researchers reported that participants and bystanders formed bonds with the robot and that they expected to keep the connection or the benefit (R1+R2c, R4, R8, R9a, R11). This ranged from older adults asking whether the system could stay; families and clinicians requested continued access or integration into routine therapy, kids getting attached over two months and feeling sad with the robot "goodbye", or, for example, people with tetraplegia asking if the robot could remain as a permanent extension of their agency.

In a pediatric oncology hospital (R4), staff themselves grew attached as the robot was incorporated into daily routines and relationships, over a three-year deployment. A long deployment showed that while *"achieving strong acceptance is easy,"* sustaining it demands careful logistics because people form attachments and *"expect the robot to sustain emotional commitment over long periods."* Interestingly, *"In the case of the staff, the robot had no predefined role (for the staff). However, the friendship (with the staff) was a byproduct of the general dynamics of the environment and how the robot mingled (...), may create situations where it is easier to "talk" to a robot than to a fellow staff member. This contributes to fostering an emotional attachment to the robot."* (R4). Nevertheless, when the project funding ended, removing the robot from the hospital dissolved existing relationships for all participants. However, staff members expressed regret that the project did not continue, *"and, in a sense, blamed (the cold) researchers who only care about the research"* (R4). Some researchers felt helpless knowing that the withdrawal moment inevitably would come, and they would have to face it. They knew the problem was scientifically and socially significant, but the project's limited funding dictated the end of the interaction. A two-month school deployment also produced

attachment. R9 prepared a scripted "goodbye" where the robot itself said it was nice to meet the children and recalled good moments, yet *"the emotional response to the participants was more aroused than I expected, given that it was a robot they were saying goodbye to. Despite the clear expectation setting at the beginning of the study, researchers could not avoid the emotions the participants felt."* R9 concluded, *"Even if the research team develops a study protocol that is ethical (approved by the IRB), they cannot control or anticipate all the possible responses the participants have towards robots."* and *"Interacting with robots over a long period of time, and if the interaction is positive, there is nothing "rational" that the research team could say to a participant about a robot because they had formed an emotional bond with it that goes beyond logic."* (R9). Despite consent forms stating a fixed timeline, many endings felt abrupt, either for a direct participant or the stakeholders involved. Few teams had planned closure rituals besides debriefing according to the ethics protocol.

In homes and schools, study endings also carried emotional weight for children, as R11 explained, *"During the study with the families, children had activities with the robot. It's a new toy. After the two weeks of spending time with the robot, the researcher would take it away, which caused some sadness in the children, who were unable to keep it, and even asked their parents to buy one."* This often puts the researchers in a difficult situation, because *"I cannot give them one robot... As a researcher, I am getting what I need out of this study, but for the children, they had a robot friend that was taken away (...) Some of the characteristics of robots in general are anthropomorphically designed for children to relate to the robot."* These types of situations raised some ethical tensions that were difficult to navigate, because researchers *"feel good for giving the children the opportunity to interact and learn about robots, but at the same time feel bad for taking it away from them."* (R11).

Studies that were terminated early also triggered EEs: *"I thought it was interesting, I was happy, and felt that the robot was succeeding, as the intended goal was to make people with Alzheimer's remember by reminiscing. However, after the institutional staff deliberated the next day, I was told that the study was being interrupted and canceled, but not unanimously."* For example, R1 described how misalignments on the robot's impact led to a contentious early end to the study. This outcome made R1 feel that: *"I felt frustrated and sad because it took me one and a half years to get authorization (...) Additionally, the protocol was for 6 weeks, and I was in the third week when everything collapsed (...) I thought I was ready, but only to deal with people with Alzheimer's, not the rest of the stakeholders who might have different perspectives (...) I felt guilt and helplessness (...) Ultimately, I lost the connection with the care home, which influenced my PhD path. I still study older adults, but not specifically people with Alzheimer's."* These endings and contested closure EEs strained relationships, sometimes shortened deployments, and in some cases disrupted long-term access to sites and shaped future research trajectories.

4.6 Aftermath and Responsibility (After-Study)

EE consequences do not stop at the end of a study. Sometimes, researchers learned about attachment and expectation EEs via staff or family follow-ups, through back-channel emails, phone calls, or staff conversations **days or weeks later** (R3, R5, R9, R11). We also saw two more EEs *"after the study"*: delayed impacts (e.g., lingering worries about the robot by participants) and responsibility, such as what researchers owe once the protocol ends, like follow-ups, reputational effects, shifted site relationships.

In an assisted-living facility, a female older adult adopted a dog after the study concluded because of the robot's conversation about companionship: "*[the robot] told me to get a dog, and I did.*" This event was noticed only a few weeks after, leaving R3 "speechless": *"The actual emotional challenge was when we went back to the care facility. The front desk lady told us not to program the robot to suggest a dog adoption, because previously, the resident had gotten a dog but could not take care of it."* These types of situations were described as being challenging to unveil before it actually happens because *"the robot could not foresee the consequences of this particular participant wanting to get a dog, nor did I anticipate that this conversation about the dog would have negative implications."* (R3). Here, the EE appeared post-study, reported by staff rather than the participant, with direct EE outcomes for both sides because *"As a result, the facility had to find another adopter for the dog,"* provoking unwanted distress on the participants and simultaneously on the researchers, as the researcher felt partially responsible for this outcome.

Another example of EE situations after deployments was described at a school (R5). A child who had watched a robot being ostracized, which was the intended goal of the study, got worried and *"in the days after the child's session, she went to the researchers to ask about the robot's well-being and feelings"* (R5). Considering that the child was concerned and worried about the well-being and feelings of the robot, and *"...to reduce the emotional impact of the robot's experience, we brought the robot back to the school one week later, to show the child that the robot was well and not affected by the exclusion"* (R5). This ad-hoc aftercare gesture reassured the participant, but it also showed that researchers' study protocols rarely plan for post-session empathic carry-over once the study is over. Aside from the child, the researchers felt *"frustrated and worried about the child"* and guilt of not doing *"enough to avoid these uncomfortable moments and this carry-over effect (...) after the session, for the researchers, it was also impactful as researchers wanted the child to be comfortable after the robot's experiences."* (R5). This additional improvised protocol gesture made the child reunite with the *"robot again at the school. The child was very happy. She played with the robot, holding and hugging it. The child never asked for the robot again."* Requests for continued access are not uncommon across contexts after formal withdrawal. Residents, families, clinicians, or participants sometimes asked whether the robot could remain, be integrated into therapy, or be made available weekly. Although study timelines had been explained during informed consent, expectation EE often became most visible at the end and were forwarded second-hand by staff or families after the researchers had left. Ethical questions sometimes extend beyond the protocol boundary. Some researchers faced uncertainty about what to do with emergent personal information discovered incidentally. There was uncertainty between privacy ethical obligations and responsibilities to report in ways that help rather than harm. This uncertainty can stem from *"(1) the obligation to protect one's privacy (2) being unclear how this information should be reported to create benefits (and not harm) of the participant"*(R9). Another researcher reminded us that post-study responsibilities are relational, not merely transactional: *"We are building a relationship with them*

every time we ask them something, we go to them with a new prototype, we go to their schools. We are taking their time for our benefit, and user-centered or community-driven design cannot be a one-way street."(R11). A delayed recognition of the impact marked the after-study phase, and this after impact was only noted because **some participants or indirect stakeholders reported back to the researchers that something had happened or was still happening.** This led to ad-hoc protective actions by researchers when aware that something was unresolved. These post-deployments influenced how participants remembered the study, how institutions judged the technology, and whether research teams could return, despite occurring after the last logged interaction. A final facet of after-study responsibility EE is what gets recorded, and, most interestingly, what gets omitted in publications.

Unreported EEs: Reporting, Omission, and Publication Constraints. Almost all authors acknowledge that EE were often omitted from papers. The reasons were around lack of *"fit"* and potential *"risk"*. Researchers excluded the episodes because the participant did not complete the whole study protocol or the incident did not align with the paper's argument or RQs as stated by R3 *"I did not (report), because that was not the study's main focus or argument"* and also R2 *"No, because it is different from my (paper) argument."* or even R1 stressing that *"There was no longitudinal study in full (...) The study protocol was not executed entirely (...) I did not report the emotional challenge and the consequences that emerged from that. I focused the paper only on the design of the robot as a concept"* (R1). Venue constraints also mattered, meaning that *"...the current publication venues and publication norms do not allow for talking about unintended consequences in publications"* (R6). Transforming a paper into a cohesive narrative often collides with reporting on tangent cases that, although they happened during the study, fall out of scope. Some authors also worried about the traditional perspectives of the community on what a paper should entail: "*First, we all tend to think that papers that do not report positive results should not be published. The justification is always that we should work more and bring new results when the results are better, but I don't think I could do anything differently in this case. Secondly, there is some stigma"* (R8). Researchers also described structural gaps, in which ethics processes and IRB protocols infrequently create space to surface gray-zone moments once the robotic deployments began, as R6 expressed: *"Our IRB contact was great in helping us navigate the ethical/legal liabilities (...) However, this was mainly months before our study was initiated. Once the study started, we didn't need to communicate with our IRB office unless something went very wrong (...) I wish we had something like a low-stakes debriefing meeting with the IRB."* Formal processes were set up to focus on potential harm rather than on daily emotions and affections, as R6 advanced, *"Our IRB policies had a "reportable event" procedure; however, this was reserved for more "serious" events, which we haven't experienced, like child abuse, misuse of data, data storage policies, etc."* and suggested that in future research, researchers should have *"institutional support systems, after an event like this happens"* (R6).

Researchers also measured the cost and benefit of publishing certain information to protect relationships with families, institutions, or robotic company collaborators. One of these reasons or a mix of these worries led researchers not to report an incident. Some felt they lacked enough instances to justify a paper. *"The study is published but does not mention this event (...) I have never written a scientific paper about this topic. The occasions where this happened were isolated and did not grant enough data to elaborate on a paper on this topic"* (R9). Others later regretted omitting key episodes, such as R1, who explained, *"Now, some years have passed, and I do regret not mentioning that. It would have been more interesting for the HRI community for me to report that episode, so others can also learn from it"* (R1). Notably, two researchers (R7 and R10) redirected the entangled emotional experience into HRI future work, which *"has influenced future publications, including a systematic review on a mitigation strategy"* (R7). R6 also suggested that future HRI practices should account for *"institutional support systems for researchers to come together after an event like this happens and discuss alternative coping mechanisms."* R9 brought a conclusive point in this sense by reminding us why these moments matter methodologically in HRI, and why *"The main message for me was that in HRI studies, where a lot of time we deal with vulnerable populations or try to solve real-world problems with robots, it is likely that they will express their inner world and that they will not just "finish the research task". After all, we are dealing with humans, and not with robots"* (R9). Omitting EEs creates blind spots and distorts what the community learns.

5 Discussion

Emotional entanglements are expected features in every phase of real deployments, not just protocol deviations, yet HRI rarely names or reports them. Before the study, we saw anticipation, gatekeeper misalignment, and first-contact distress EEs. With entanglement as a metaphor, we highlight the emotional knots that tie multiple stakeholders together. During the study, ambiguous emotions, researcher role conflict, tech failure, and blame EEs. At the end, attachment and contested closure were common EEs, and after the study, EEs derived from delayed impacts and responsibility to follow up. EEs are often ambiguous; Tears can mean harm, healing, or both. Attachment can be a success for participants and for our studies, but at the same time, a risk for exit [5]. A robot's prompt can be heard as advice, with consequences after the study ends. In these situations, researchers carry the weight of these EEs, and many maintain their well-being through informal dialogue with peers and loved ones, but our community lacks formal ways to name, plan, and learn from this work [46]. Our EE types translate general reflexive ethics into robot-specific realities, where embodied systems, deployment logistics, withdrawal, and multi-stakeholder obligations routinely create ethically important moments. EEs are more than emotional events because they restructure methods, reporting, and access. Ignoring them risks methodological distortion and potential ethical harm. Below, we describe the importance of reporting EEs and propose a checklist to better inform future HRI in-the-wild research.

5.1 Bringing Emotional Entanglements to the Surface

Emotional sustainability is critical yet underdeveloped in in-the-wild HRI. A big reason is that researchers' emotions rarely appear alongside participants' experiences, which means teams improvise

in the moment, and we learn less from one another's EE. In our cases, we had to decide on the spot when a child was frightened, when tears came from nostalgia, when staff expressed regret that a project was ending, and asked for continuing [5, 12]. We often wondered whether we were doing the right thing. That uncertainty can be read as 'inexperience', which heightens our stress and also shapes how participants and stakeholders read the situation.

These gaps stem from a lack of collective learning. We rarely document or explain how emotional dynamics affect data validity. Researchers bear the primary responsibility for managing emotionally entangled situations in the field, yet current practices for recognizing and addressing them are largely informal. Indeed, this very paper grew out of hallway conversations at the HRI conference, where researchers shared experiences of navigating similar challenges. That pattern mirrors prior work on situational ethics, failure sharing, and researcher wellbeing [19, 30, 66]. The cost of keeping these discussions in hallways is high: the very moments that shape trust, attachment, safety, and collaboration between humans and robots often disappear from our shared body of knowledge.

If, instead, such conversations were brought to the surface, and we openly name the emotions arising with participants, we can anticipate likely dynamics and plan to prevent further entanglement. With that preparation, researchers can pause, de-escalate, reassure bystanders, and support participants in the moment, which tends to build trust when people see an effort to resolve the situation [15]. Emotional resilience is not just self-management; it creates more sustainable, supportive conditions for everyone in HRI. This is especially important for EE that are inevitable, like attachment [37].

5.2 Emotional Sustainability in HRI: A First Step

A brief, routine norm of reporting these episodes would make our evidence truer to practice and lead to more responsible, replicable studies. It would improve participant care, support researchers' well-being, and build a body of evidence others can adopt. We treat EE as the events to notice and name, with emotional sustainability as the long-term goal. Based on our reflection, we suggest that researchers think in four phases. (1) **Before the study**: Clarify the purpose, uses, and context of the robot. Ask who benefits, who decides, who uses it, and who might be harmed or excluded. Anticipate misuse and possible harms, and decide which benefits you would trade off to reduce those harms. Identify stakeholders, decision-makers, and those who can pause or stop the study. Write a short contingency plan, if things stop accidentally, what actions to take. (2) **During the study**: Before each session, check context and consent in plain words. When issues arise, make a quick note and confirm consent again, much as it is negotiated in the moment rather than fixed by an upfront framework [25]. (3) **End of the study**: Close with care, debrief participants and the team, document decisions, and remove the technology responsibly. (4) **After the study**: Follow up with participants, write an honest case report, share a de-identified version, and reflect on team well-being. We offer a detailed checklist derived inductively from our reports (See Supplementary Materials) as a practical prompt to use alongside IRB/REC, much like prior ethics checklists used as conversation prompts [42], together with bottom-up methods [9] that fit real contexts and organizational constraints (university, hospital, school, care-home policies), supporting practitioners in mediating EEs. We hope this lays a foundation for creating a common language to coordinate with collaborators and stakeholders, justify pauses, and leave a brief *"what we learned"* trace others can build on. Concretely, we suggest an **emotional sustainability checklist** that anticipates, plus a slim event note logging phase, actors, type, impact, and action taken. We also encourage adding a few honest sentences in papers about what happened and what researchers would do next time. This bridges formal permission and lived, moment-to-moment practice without heavy paperwork. Methodologically, this contributes a minimal, generalizable reporting method and a shared vocabulary and prompt set (phase, actors, EE type, impact, response) that teams can append to IRB/REC to routinely document EE and enable future comparison and meta-analysis across studies.

At the community level, we aim for small, feasible changes. Venues can welcome concise EE notes as part of responsible reporting, in appendices or repositories, seeding a shared case box, reducing HRI blind spots, and improving reproducibility in messy settings [53]. The insight is not *"it didn't work in-the-wild,"* but where, how, and why things happened, aligning with calls to move beyond negative results [4], and pair visible findings with brief accounts of breakdowns and contested moments.

6 Limitations and Future Work

This paper is a first step toward *Emotional Sustainability in HRI*. Our corpus is retrospective and authored by the researchers who ran the deployments across multiple contexts and populations. As a collaborative autoethnography, our corpus narrows its scope and limits external validity. We focus on the perspectives of the researchers and do not systematically collect the accounts of the participants, family, or staff. The checklist is derived from our cases, intentionally minimal, and not yet evaluated at scale. Next, we will use our checklist with researchers, and stakeholders and pilot the prompts in multi-site deployments and study: (i) usefulness and burden for teams, (ii) EE such as distress handled and clarity at endings, (iii) organizational outcomes such as access retained and fewer EE, and (iv) researcher EE such as ethical distress. Our contexts were primarily social robots in healthcare, care homes, education, and homes, so generalization to other sectors may be limited. We frame *Emotional Entanglements* as a lens, not a validated framework, offering opportunities for future research to be explored further through co-design, refinement, and iteration. Our aim is a practical shared language to notice and report EE as a path to stronger, emotionally sustainable HRI.

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