Pause, Reflect, & Redirect: A novel approach for empowering kids to be safer online by helping them make better decisions

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Abstract

Many stakeholders from parents to policy makers are concerned about child and adolescent online safety. Present solutions are punitive and lack opportunities for youth to make mistakes and try again in a safe environment. This paper proposes a new framework, based on trauma-informed child psychology models and research by computer scientists and human-centered design scholars. Entitled Pause, Reflect, and Redirect (PRR), the new framework offers 3 levels of intervention ranging from casual engagement to coached engagement to crisis response. To further develop and validate PRR as a framework, Safe Kids AI has implemented PRR within a web-filtering software and studied its efficacy. Preliminary results from the deployment of the software in two public middle schools suggest that it may help young people to make better choices with respect to their online behaviors.

Keywords: adolescent online safety, parental control, decision making, education technology

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Adolescent online safety is top of mind for many worldwide, from youth and parents to educators and policy makers. Problematic Internet Use (PIU) has long been an issue for children and teens. Spada (2014) described PIU as excessive use of the internet that leads to negative consequences in everyday life. Since the rise of online schooling and restrictions prompted by the Covid-19 pandemic, as young people and their adult ecosystem have navigated a more digitally centered life than ever before, PIU has increased (De France et al., 2022). Previous studies demonstrated the connection between PIU and adolescent mental health and wellbeing (Caplan, 2010; Restrepo et al., 2020). Pappas (2021) noted that adolescents regularly exposed to explicit adult content online were up to 3 times more likely to be the target or perpetrator of dating violence in real life. The danger is especially acute for already-vulnerable populations, including Black and Indigenous youth, young people of color, and minors in foster care (Badillo-Urquiola et al., 2017).

Despite evidence of the antecedents and consequences of PIU, the solutions to it remain unfortunately inadequate. Current approaches to managing internet use rely heavily on blocking access and restricting use (Vargas et al., 2019). These punitive measures do not address the underlying issue–that PIU is primarily an impulse control disorder (Shapira et al., 2003)–and, as such, do nothing to change behavior. Existing parental control software treats every infraction with the same level of severity (Ghosh et al., 2020). Further, these systems frequently report data about adolescents' internet use to parents, teachers, and school administrators with limited or no context, potentially exposing young people from vulnerable groups (e.g., gay and transgender youth) to harm (*Policy statement of the Federal Trade Commission on education technology and the Children's Online Privacy Protection Act*, 2022).

Compounding the challenge of finding a solution, research on this topic to date has been nearly exclusively conducted in limited geographic areas (primarily the United States) with over 80% of the data being self-reported by teens (Pinter et al., 2017). Less than 2% of the data analyzed in peer-reviewed studies has come from educators. More than 85% of the existing studies considered only a snapshot in time with no longitudinal data. Often, researchers ignored the intersection of various risks, with most

studies only factoring in a single risk from a limited set, such as cyberbullying or exposure to pornography. Nearly all of the software products on the market aimed at combating this problem were designed without input from youth and only rarely with input from educators and child psychologists (Ghosh et al., 2020). The need for more research and public policy initiatives in this space is clear and present (Ammari et al., 2015), as is the need for evidence-informed tools that support young people in learning to safely operate in an increasingly online world.

Foundational frameworks

Researchers have identified essential behavioral skills that contribute to teen online safety. Known as the Teen Online Safety Strategies (TOSS) framework, Wisniewski et al. (2017) highlighted the importance of addressing the underlying elements that contribute to unhealthy online behavior by teens. Skills related to emotional intelligence–self-awareness, self-regulation, and situational awareness–are crucial. Tools intended to promote adolescent online safety must begin by building up the abilities of teens to understand their feelings and reactions to online content as well as the nature of the content itself and its unspoken agendas. I posit that pairing the TOSS framework with a trauma-informed approach to child and adolescent behavior correction offers a powerful, novel approach to supporting young people in using the internet in their highest and best interest.

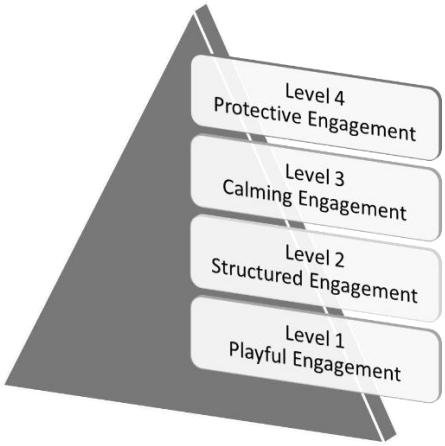
Trust-Based Relational Intervention (TBRI)™ is a trauma-informed child psychology framework that provides a means for adult caretakers to connect with children and adolescents on a level that fits the severity of the offending behavior and fosters an environment where a young person can continuously try to improve behavior (Purvis et al., 2013; Purvis et al., 2011). Purvis et al. (2009) created TBRI for use by adult caretakers in face-to-face interactions with young people exhibiting situationally inappropriate behavior. TBRI has four levels of intervention: Level 1 – Playful Intervention; Level 2 – Structured Engagement; Level 3 – Calming Engagement; Level 4 – Protective Engagement (Parris et al., 2015; Purvis et al., 2014; Purvis et al., 2015).

Playful Intervention is the first level of TBRI, designed to keep interactions open. Rather than having a caretaker issue a declarative statement that a child has done something wrong, it encourages a slightly tongue-in-cheek response such as, “Are you asking me or telling me?” (Parris et al., 2015). Interestingly,

this type of approach is something that many parents do with their children naturally. The TBRI framework aims to have approximately 80% of all problematic behavior addressed at this level. The second level of TBRI is known as Structured Engagement. Purvis et al. (2013) intended for adult caretakers to use this approach in response to young people who do not modify behavior as the result of a first-level, playful intervention. The adult caretaker should respond more firmly by acknowledging the persistence of the inappropriate behavior and offer the young person an opportunity to redo the behavior or to disengage from the situation. The third and fourth levels of TBRI address threats of violence and violent behavior on the part of young people in real life (McKenzie et al., 2014). Figure 1, below, depicts the 4 levels of TBRI.

Figure 1

4 Levels of TBRI



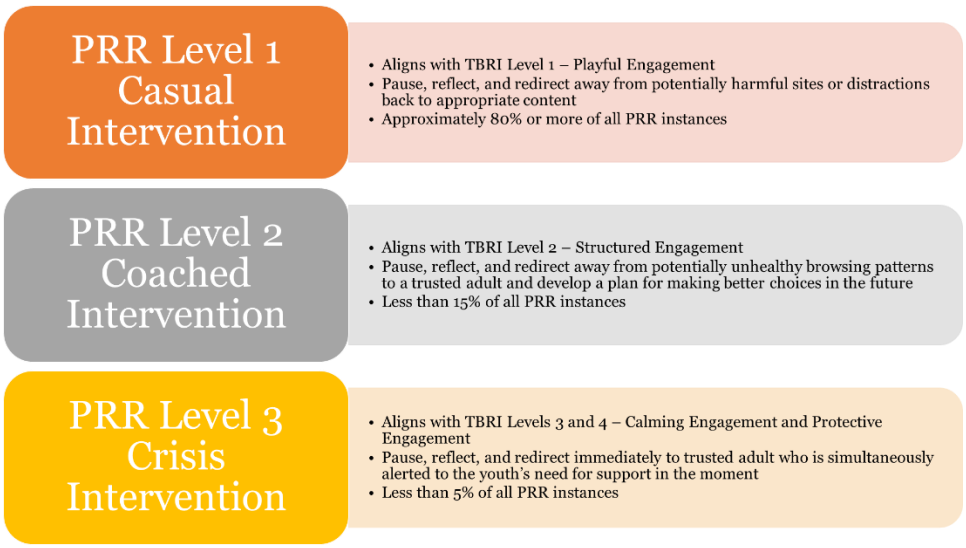
Embedding PRR into online safety software

Translating these established practices into the internet safety arena, I propose the Pause, Reflect, and Redirect (PRR) framework. PRR has 3 levels of intervention: Level 1 – Casual Engagement; Level 2 – Coached Engagement; Level 3 – Crisis Engagement. These levels align with elements of the four levels of TBRI and draw on the key skills for adolescents identified in the TOSS framework. By providing opportunities to learn through feedback, knowledge sharing, and dialogue with trusted adults, young people are empowered to make better online choices in the future. These interventions conform to what

the TBRI framework presents as the "IDEAL response" (Purvis et al., 2013, p. 375). For engagements to be most impactful, correction must be linked to the behavior in real time; be directed at the behavior and not the young person; be measured and proportional; and offer an immediate opportunity for a redo, providing an opportunity to try again in the moment. Figure 2, below, depicts the 3 levels of PRR and their correspondence with the TBRI framework.

Figure 2

3 Levels of PRR



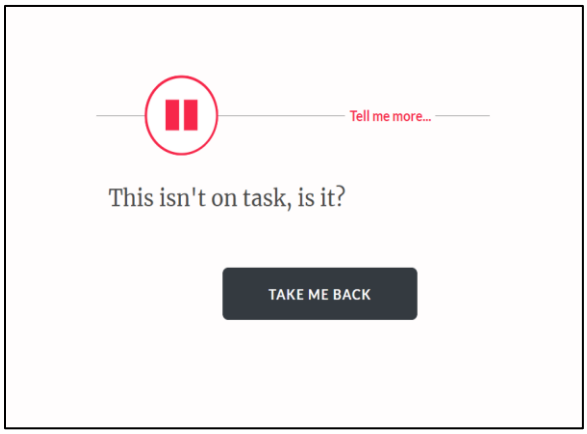
TBRI Level 1 – Playful Intervention calls for meeting young people with only the level of firmness required to redirect them from potentially harmful online content to something more appropriate (Purvis et al., 2009). Converting this approach into online safety software, PRR Level 1 works by providing a casual response to a young person testing the bounds of their online access. When a youth visits a site that is potentially harmful or situationally inappropriate (e.g., going to an off-topic website during classroom instruction) (Junco, 2012), they are met with a gentle prompt in the form of a question (e.g., "This isn't schoolwork, is it?"). Under stress, the brain releases the neurotransmitter cortisol (Braisby & Gellatly, 2005). Although cortisol can boost energy in the short term, helping a person to react in a fight-or-flight situation, it can negatively affect cognitive function and inhibit sound decision-making and critical thinking (Hambley, 2020). Managing the stress behavioral interventions create for young people is important for allowing them to make positive choices in those situations (Panksepp, 2000; Parris et al.,

2015; Purvis et al., 2013; Purvis et al., 2015). Because this approach does not trigger a stress response, as studies showed existing internet blocking and restricting software often do (Badillo-Urquiola et al., 2020; Biernesser et al., 2021), it creates an opportunity for young people to learn.

This learning is an essential element for fostering change in young people's online behaviors that benefit their social and emotional wellbeing. Generally, the reasons why individuals—both adults and children—successfully change behavior are well understood: they believe they can do it and that doing so will improve their lives (Rothman et al., 2004). PRR gives young people the confidence that they can make better online decisions and the knowledge that doing so will inure to their benefit. Figure 3, below, present visual representations of the screens presented to young people in PRR Level 1.

Figure 3

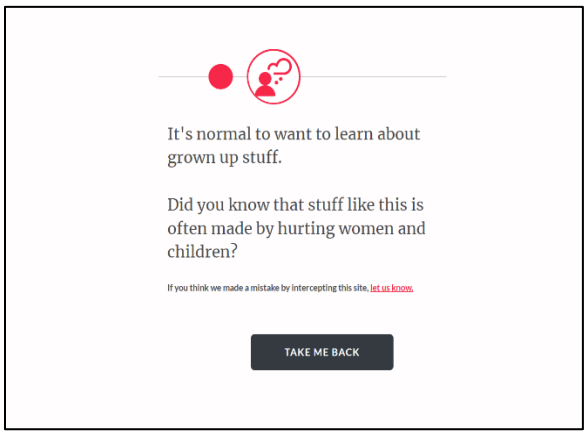
Representation of PRR Level 1 screen



By providing a concise explanation of why the system intercepted a particular site, young people can understand how they might make a better choice in the future (Ghosh et al., 2018). Further, by offering an immediate opportunity to try again, young people build up the belief in their ability to make better choices. For example, a teen trying to access explicit content might be informed about the relationship between viewing this content and real-life dating violence or the exploitative nature of how this type of content is produced (Peter & Valkenburg, 2009; Rostad et al., 2019). Figure 4, below, presents an illustration of the "Tell me more…" educational feature.

Figure 4

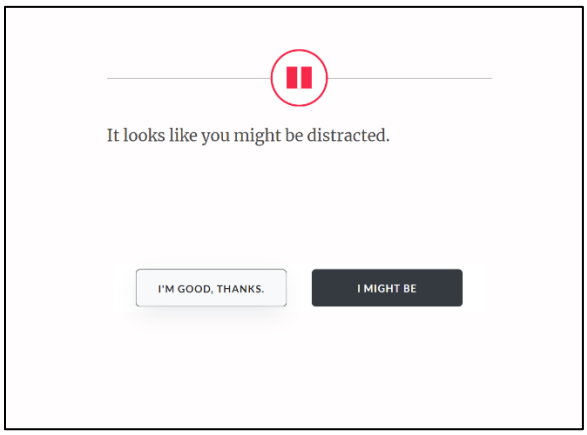
Representation of PRR Level 1 screen with in-the-moment education via "Tell me more…" feature

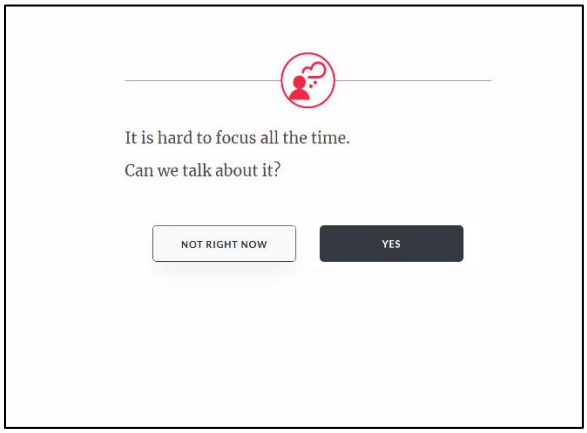


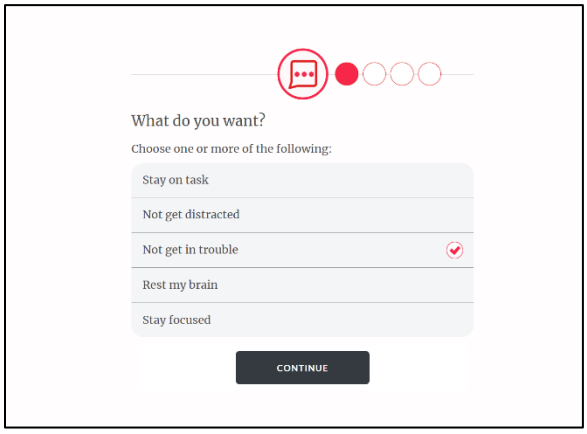
If a young person is persistent in trying to access inappropriate material or consistently wandering off-task during classroom instruction, they will trigger PRR Level 2. In this case, the young person will encounter a more formal intervention that redirects them to an interactive chat or a message to a trusted adult, like a parent or teacher to develop a plan to make better choices online. This is similar to the second level of TBRI (Purvis et al., 2009). The aim of Coached Engagement is to give the young person a more structured approach to their online behavior in communication with a trusted adult caretaker. In keeping with TBRI principles (Purvis et al., 2013), PRR Level 2 has the natural consequence of limiting a student's browsing to only educational sites until the behavior that resulted in the PRR Level 2 trigger is addressed with an adult. Figure 5, below, presents a potential flow of interactions for a young person in PRR Level 2.

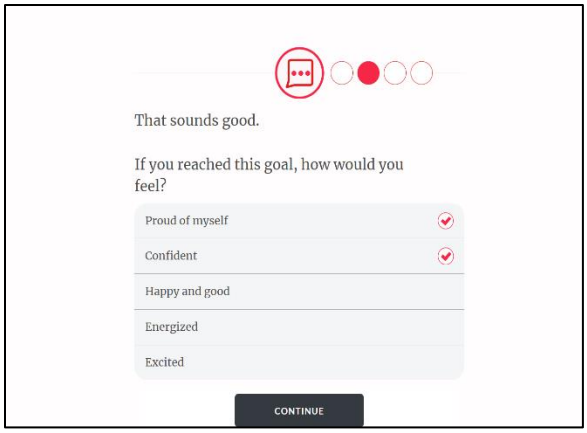
Figure 5

Example flow of interactions for a young person in PRR Level 2

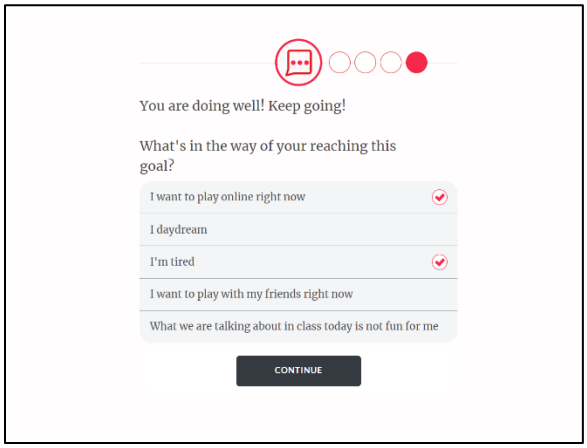


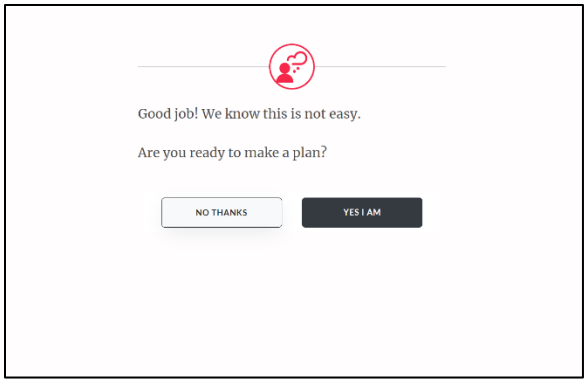





That sounds good.
If you reached this goal, how would you feel?
Proud of myself
Confident
Happy and good
Energized
Excited
CONTINUE


If you did this, what would happen?
I would get praise from people who matter to me
I would do better in school
I would do better on tests
I would learn more
I would not get in trouble
CONTINUE


You are doing well! Keep going!
What's in the way of your reaching this goal?
I want to play online right now
I daydream
I'm tired
I want to play with my friends right now
What we are talking about in class today is not fun for me
CONTINUE



Adapting Levels 3 and 4 of TBRI into the online safety realm is challenging. Software is not well-positioned to manage situations of imminent threats of harm to self or others autonomously (Biernesser et al., 2021). In rare circumstances, such as when a young person is seeking weapons, promoting violence, or searching out means of self-harm online, PRR Level 3 works by immediately redirecting young people to a trusted adult caretaker and providing access to resources, like suicide prevention helplines. Figures 6 and 7, below, illustrate a potential flow related to PRR Level 3 intervention with youth and adults.

Figure 6

Representation of PRR Level 3 intervention for detection of self-harm risk

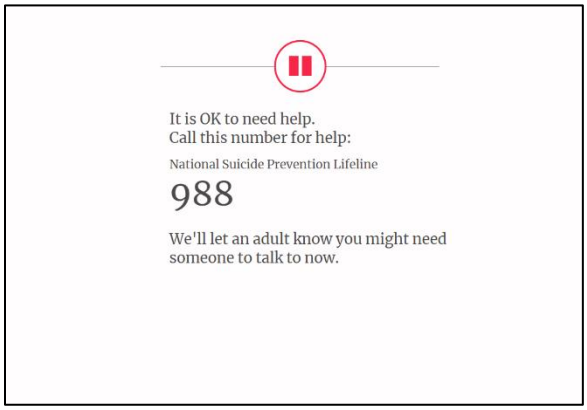


Figure 7

Representation of adult text message alert to PRR Level 3 intervention for detection of self-harm risk

Gentle prompts at all levels of PRR create pauses for young people as they navigate the online world where they can consider, and potentially predict, the outcomes of their actions. Research suggests that, from an early age, when youth are given opportunities to silently pause they are able better to appreciate context and consequence (Read et al., 2019). There is no sound incorporated in PRR because of the benefits silence provides in grounding young people and creating an environment for decision making (Dulčić, 2021). Each level of PRR offers young people an opportunity to pause, enabling them space to consider the situation and their actions.

Pilot application of PRR

Safe Kids AI developed two software products integrating the PRR framework: Safe Kids at School and Safe Kids for Email.

Safe Kids at School

The first product, Safe Kids at School, was implemented in a public middle school comprising grades 6 to 8 (i.e., ages 11-14) in an urban charter district. Approximately 85% of the school's students qualify for free or reduced-cost lunch under the Richard B. Russell National School Lunch Act (79 P.L. 396, 60 Stat. 230). Table 1, below, presents basic demographic data on the school's student population.

Table 1

Pilot school demographics

Enrollment by race/ethnicity	
African American	44.7%
Hispanic	42.1%
White	9.2%
American Indian	0.0%
Asian	2.6%
Pacific Islander	0.0%
Two or more races	1.3%
Enrollment by student group	
Economically disadvantaged	69.1%
Special education	26.3%
Emergent bilingual	6.6%

The purpose of the Safe Kids at School product was to provide opportunities for students to pause, reflect, and redirect themselves back on task during classroom learning while using internet-enabled devices during the school day. The school's information technology personnel installed the software on all 77 students' school-issued Chromebooks on the first day of the 2022-2023 school year. Safe Kids at School replaced the school's existing web filtering software.

At the time of this writing, 5 weeks of data were available for analysis from this deployment. Although the software was deployed on the devices of 77 students, not all students were active users each week. For disciplinary, health, and other reasons, the number of students using devices at school varied by week. Table 2, below, shows the number of active student users of the Safe Kids at School software by week.

Table 2

Active student users of Safe Kids at School by week

Week	Active users
1	77
2	73
3	75
4	73
5	71

In the first 5 weeks of the product's implementation, the number of attempts by students to access off-topic or inappropriate online content during classroom instruction decreased by approximately 58%. Table 3, below, presents the number of clicks on website links (i.e., uniform resource locators, URLs) triggering a PRR response by the software.

Table 3

Website clicks and PRR triggers

Week	Total URLs clicked	Total clicks triggering all PRR levels	Clicks triggering PRR (all levels) as a percentage of total URLs clicked
1	23,925	984	4.11%
2	5,594	211	3.77%
3	37,286	884	2.37%
4	47,714	906	1.90%
5	41,692	718	1.72%
Overall increase / (decrease)			(58.13%)

Distinguishing between URL clicks triggering the lowest level of PRR intervention (i.e., PRR Level 1 – Casual Intervention) and those triggering higher levels of response, the data shows about 77% of student users did not trigger a PRR response beyond Level 1 during the 5-week period. This finding is consistent with the TBRI framework's expectation that approximately 80% of problematic behavior is corrected at the lowest level of engagement. Approximately 23% of student users triggered a PRR Level 2 intervention during the period. Of the 18 users who triggered a PRR Level 2 intervention, only 2 repeated the offending browsing behaviors after having their access restored by a teacher. This information indicates that 17 students chose to change their behavior after the PRR Level 2 intervention.

During the period, only 1 student triggered a PRR Level 3 response. The intervention was triggered by the software intercepting the student user searching for a modern gun. In an interview with the school's principal who received the alert from the system and subsequently spoke with the student, we learned that the student was curious about the gun that appeared in a popular video game. From the conversation with the student, the principal determined that the student was not seeking to obtain the weapon and was not a threat to others. The principal explained that although the alert did not uncover a potential threat to the

school, the intervention was valuable because it allowed for a dialogue with the student about situational awareness. The student came to understand how classmates might feel if they observed the student searching for the weapon and demonstrated empathy toward them. Additionally, the student also articulated to the principal a recognition that the search was not an appropriate use of classroom time.

Safe Kids for Email

Based on the PRR framework, the Safe Kids for Email software uses artificial intelligence to identify potentially unkind or inappropriate-for-school messages and prompt student users to reconsider before sending messages that are possibly hurtful or improper in the moment.

Safe Kids at School was implemented in a public middle school comprising grades 6 to 8 (i.e., ages 11-14) in a suburban public school district. Table 4, below, presents basic demographic data on the school's student population.

Table 4

Pilot school demographics

Enrollment by race/ethnicity	
African American	16.9%
Hispanic	8.3%
White	62.2%
American Indian	0.5%
Asian	1.1%
Pacific Islander	0.3%
Two or more races	10.7%
Enrollment by student group	
Economically disadvantaged	27.5%
Special education	13.2%
Emergent bilingual	1.4%

The purpose of the Safe Kids for Email software was to provide opportunities for students to pause, reflect, and redirect themselves when sending emails using their school email accounts during the school day. Representations of the PRR Level 1 interventions are presented below in Figures 8 and 9.

Figure 8

Representation of PRR Level 1 email compose intervention

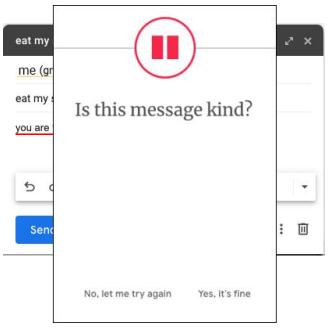
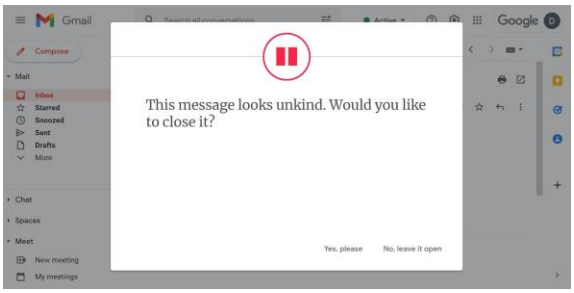


Figure 9

Representation of PRR Level 1 email receive intervention



The school's information technology personnel installed the software on all students' school-issued Chromebooks on Monday, September 19, 2022. At the time of this writing, 3 weeks of data were available for analysis from this deployment. All students were active users each of the 3 weeks. During the period, the software scanned 50,139 emails.

Received Emails

During the period, 15 students confirmed receiving unkind messages. Of the 15 students, 9 students confirmed they would talk to an adult after receiving unkind messages. No students received multiple unkind emails.

Composed Emails

During the period, students identified approximately 124 emails as incorrectly flagged as unkind by the software (i.e., false positive), a system defect rate of 0.25%. The software identified a total of 326 unkind emails during the 3 weeks. Factoring out the 124 messages identified by students as mistakenly flagged by the system, only 39 emails flagged as unkind by the software were sent by students after they were prompted to reconsider. This result indicates that only about 12% of students persisted in sending messages they had been counseled were unkind. The other 88% chose to either change their emails to be kind or abandoned them.

The students demonstrated persistence and resilience in the email revision process after being prompted by the software. The average amount of time for a student to revise an unkind message to make it kind was 15.7 seconds. In once instance, a student tried 3 times to rewrite a message before the software recognized it as kind despite the option to send it without making a change. Another student rewrote a message twice to make it kind. The students chose to modify their behavior with only the lowest-level intervention from the software.

Conclusion

The need for better approaches to adolescent online safety has never been greater. There is much work to do to get from our current state to one in which young people are empowered to make better decisions online because they are informed, supported, and connected to trust adults. It is my hope that, working together, behavioral scientists, human-computer interface experts, young people, parents, educators, and others can create a future where kids are safer online and in real life. Based on the behavior change in young people indicated by the data, I believe that PRR represents a step toward that future.

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