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EVALUATING THE IMPACT OF PSYCHOLOGICAL INTERVENTIONS ON INTERNET ADDICTION AND MENTAL HEALTH IN ADOLESCENTS: A SYSTEMIC REVIEW

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ABSTRACT

Adolescent internet addiction (IA), encompassing problematic internet use and gaming disorder, has become a significant behavioral health concern amid rising digital engagement. This systematic review aimed to synthesize empirical evidence on the effectiveness of psychological interventions—namely cognitive behavioral therapy (CBT), mindfulness-based interventions (MBIs), motivational interviewing (MI), family-based therapy, and school-based or digital programs—among adolescents aged 10–19 years. Searches across PubMed/MEDLINE and PubMed Central up to 15 September 2025 included randomized, quasi-experimental studies, meta-analyses, and umbrella reviews. Primary outcomes were IA/IGD severity and incidence; secondary outcomes included depression, anxiety, coping, sleep, and family functioning. Findings reveal that CBT consistently reduced IA/IGD severity and improved self-regulation and time management. Family-based interventions strengthened communication and cohesion, while MBIs enhanced emotional regulation, and MI improved motivation for change. Scalable interventions like school-based media literacy and app-based programs showed preventive benefits. Combined psychotherapy-pharmacotherapy yielded additional advantages in comorbid conditions. Overall, psychological interventions—particularly CBT and family therapy—emerge as effective, adaptable, and developmentally appropriate strategies for mitigating adolescent IA. Stepped-care models integrating school, family, and digital platforms demonstrate strong potential for sustainable large-scale implementation.

Keywords: adolescents; internet addiction; problematic internet use; internet gaming disorder; cognitive-behavioral therapy.

Introduction

Internet addiction disorder (IAD) is conceived as an impulse control disorder that closely resembles pathological gambling and does not involve exclusive use of an intoxicating drug. Originally IAD was suggested as a disorder by Goldberg (1995) in a satirical hoax [1]. The internet has evolved into a 'social technology' that is continually challenging researchers to examine its effects on numerous facets of social life [2]. The massive growth of the internet over the past decades has changed the profile of the computer addict [3,4]. Internet is a valuable and attractive source for people because of instant communication and access to facts, information, knowledge, and entertainment. It has become an environment that could be abused by virtually anyone, irrespective of their interest in ideas, science and technology. Internet

addiction has employed a great progressive impact on individuals' psychological wellbeing and social lives besides some other negative aspects of human life like Facebook addiction and cyberbullying. Both internet addiction and cyberbullying are electronic sicknesses that are surmised to be closely linked, it is therefore recent researcher are paying serious attention to this phenomenon [5].

The exponential growth of digital technologies has transformed the way adolescents learn, socialize, and entertain themselves [6]. While the internet provides vast educational and recreational opportunities, excessive and uncontrolled use has given rise to what researcher's term internet addiction or problematic internet use *(PIU)*. Internet addiction is generally defined as a maladaptive pattern of internet use that leads to significant impairment in social, academic, and psychological functioning. In 2013, the American Psychiatric Association formally recognized internet gaming disorder (IGD) in the diagnostic and statistical manual of mental disorders (DSM)-5 as a condition warranting further study, reflecting global concern about compulsive online behavior [7]. Similarly, the international classification of diseases (ICD)-11, introduced by the World Health Organization in 2018, included *gaming disorder* under addictive disorders. These developments underscore the seriousness of digital addiction, particularly among adolescents who are developmentally vulnerable to behavioral dysregulation [8].

Adolescence, typically spanning ages 10 to 19, is a critical developmental stage characterized by identity exploration, neurocognitive maturation, and heightened sensitivity to social influences. During this period, the brain undergoes rapid changes in regions governing executive control, decision-making, and emotional regulation This makes adolescents more susceptible to impulsivity, novelty seeking, and peer pressure, factors strongly associated with excessive internet use [9]. Epidemiological studies report prevalence rates of internet addiction among adolescents ranging from 6% to 18% globally, with higher rates documented in East Asian countries [10]. In India, China, and South Korea, excessive online gaming and social networking have emerged as leading contributors to digital overuse, with associated declines in academic performance, increased family conflict, and rising mental health concerns [11].

Mental health consequences

Problematic internet use is not an isolated phenomenon; it interacts bidirectionally with various mental health conditions. Adolescents with internet addiction frequently present with depression, anxiety, sleep disturbances, social withdrawal, and stress-related somatic symptoms [12]. Meta-analyses suggest strong correlations between internet addiction severity and internalizing problems such as depressive symptoms, as well as externalizing behaviors such as aggression and impulsivity [13]. Furthermore, poor sleep hygiene caused by late-night gaming or prolonged social media engagement has been linked to impaired concentration, reduced school performance, and heightened emotional instability. Family and peer relationships also suffer, as adolescents may substitute real-life interactions with online engagement, perpetuating a cycle of loneliness and dependence [14]. This constellation of outcomes highlights the urgent need for evidence-based psychological interventions.

Terminology and operationalization

In the literature, IA, PIU, and IAD are sometimes used interchangeably, although authors may emphasize different facets. Some prefer "IAD" to signal clinical severity, whereas "IA" is often used more broadly for the phenomenon [15]. Others collapse PIU and IAD into a single construct defined by excessive or poorly controlled preoccupations, urges, or behaviors round computer use and internet access that led to impairment or distress [16]. In this review, we primarily use "internet addiction" and adopt the definition of a condition marked by excessive

or poorly regulated internet-related preoccupations, urges, or behaviors that result in impairment or distress.

Burden and Correlates in Adolescents

IA has emerged as a salient mental-health concern in adolescence. Excessive use is linked with insomnia, anxiety, depression, low self-esteem, impulsivity, mood disorders, family conflict, self-harm, suicidal ideation, suicide attempts, and suicide. Ubiquitous smartphones facilitate continuous connectivity, and while the internet supports communication and offers relief from stress, dependence on online activity as a primary coping strategy can precipitate adverse outcomes [17].

Nosological Status and Evolving Concepts

Originally conceptualized as an impulse-control disorder [18], IA is increasingly framed as a behavioral addiction. Reflecting this shift, the WHO included Gaming Disorder in ICD-11, and the APA introduced Internet Gaming Disorder (IGD) as a condition for further study in DSM-5 Section III [18]. However, inconsistent terminology spanning labels such as "digital technologies negative use," smartphone addiction, IGD, and internet gambling disorder—has contributed to measurement variability and challenges in synthesizing evidence. Reported prevalence estimates therefore vary widely, ranging from 1.6% for IGD in parts of Europe to about 50% in Korea [19].

Neurobiological Underpinnings

Neuroimaging work has mapped structural and functional alterations associated with IA. Findings include changes in frontal and temporal lobes, limbic regions, cerebral blood flow, and reductions in gray-matter volume and white-matter integrity—particularly within the corpus callosum [20]. These neurobiological differences have been linked to decrements in executive functioning, cognition, attention, and language. Excessive use may dysregulate dopaminergic reward pathways, fostering desensitization and tolerance; converging evidence suggests IA can activate reward circuitry similarly to substance addictions. Functional MRI studies report altered responses in prefrontal cortex, anterior cingulate cortex, and striatum among individuals with IA [21,22]. Parallels with substance use disorders (SUDs) including shared mechanisms and regional brain changes are increasingly evident. In SUDs, relapse risk is tied to craving and diminished control over drug-seeking, with prefrontal alterations implicated in compulsive consumption and disadvantageous choices [23]. Structural imaging reveals reduced gray-matter concentration in decision-making, inhibitory, and affective regions among cocaine users, and diminished gray-matter density in prefrontal, temporal, and cingulate cortices among heroin users, with dose–duration relationships [24,25]. These patterns mirror observations in IA, reinforcing a neurobiological basis for the condition in youth and underscoring the value of multidisciplinary approaches.

Rationale for Psychological Interventions

Internet addiction in adolescents arises from complex cognitive, emotional, behavioral, and environmental factors; thus, psychological interventions remain the cornerstone of management. Pharmacological options have limited evidence and are not first-line treatments [26]. Effective psychological approaches include CBT, which restructures maladaptive thoughts and promotes self-regulation [27]; Mindfulness-based interventions, which enhance emotional control and reduce impulsive online behavior [28,29]; Motivational Interviewing, which builds intrinsic motivation for change [30,31]; and Family-based therapy, which

improves communication, parental monitoring, and family cohesion, thereby reducing addiction severity and supporting sustained recovery [32,33].

The Global Evidence Landscape

A growing body of empirical research supports the efficacy of these interventions, but findings are scattered across diverse contexts. For example, school-based CBT programs in Europe have demonstrated reductions in gaming disorder symptoms, while family-based approaches in East Asia have improved both adolescent outcomes and family cohesion. Online mindfulness sessions have reduced smartphone addiction among university students, though fewer trials have specifically targeted younger adolescents. Motivational interviewing is still under-researched, with most evidence emerging from feasibility or pilot studies. Despite these advances, methodological heterogeneity differences in diagnostic criteria, outcome measures, and intervention formats have made it challenging to draw definitive conclusions about comparative effectiveness [34].

Need for a Systematic Review

Although several narrative and scoping reviews have examined internet addiction interventions, there remains a pressing need for a comprehensive systematic review that focuses specifically on adolescents and integrates outcomes related to both internet use and mental health. Adolescence is a unique developmental stage, and interventions effective in adults may not directly translate to younger populations. Furthermore, the co-occurrence of internet addiction with depression, anxiety, and sleep problems necessitates a dual focus on behavioral and psychological outcomes. By synthesizing existing evidence, this review aims to provide clarity on which psychological interventions are most effective, under what conditions they work best, and how they can be adapted for broader implementation in clinical and community settings.

Objectives

The systematic review is guided by the following objectives:

1. To evaluate the effectiveness of cognitive behavioral therapy in reducing internet addiction and improving mental health outcomes among adolescents.
2. To examine the role of mindfulness-based interventions in enhancing self-control, reducing problematic internet use, and alleviating internalizing symptoms.
3. To assess the impact of motivational interviewing on adolescents' readiness for change and reduction in problematic digital behaviors.
4. To determine the effectiveness of family-based interventions in promoting healthier digital habits and improving family functioning.
5. To explore the extent to which intervention delivery formats (school-based, online, or clinic-based) influence accessibility, adherence, and effectiveness.

Significance of the study

This review holds practical and theoretical significance. For clinicians, it identifies evidence-based approaches that can be incorporated into adolescent mental health programs. For educators and policymakers, it highlights the role of schools as effective delivery platforms for preventive interventions. For researchers, it identifies gaps such as the need for standardized outcome measures, longer follow-ups, and culturally sensitive adaptations. The findings can inform the development of guidelines and contribute to national strategies for adolescent

health, particularly in societies where internet use is rapidly growing. Ultimately, the review aims to support adolescents in achieving healthier digital engagement, improved psychological well-being, and better academic and social outcomes.

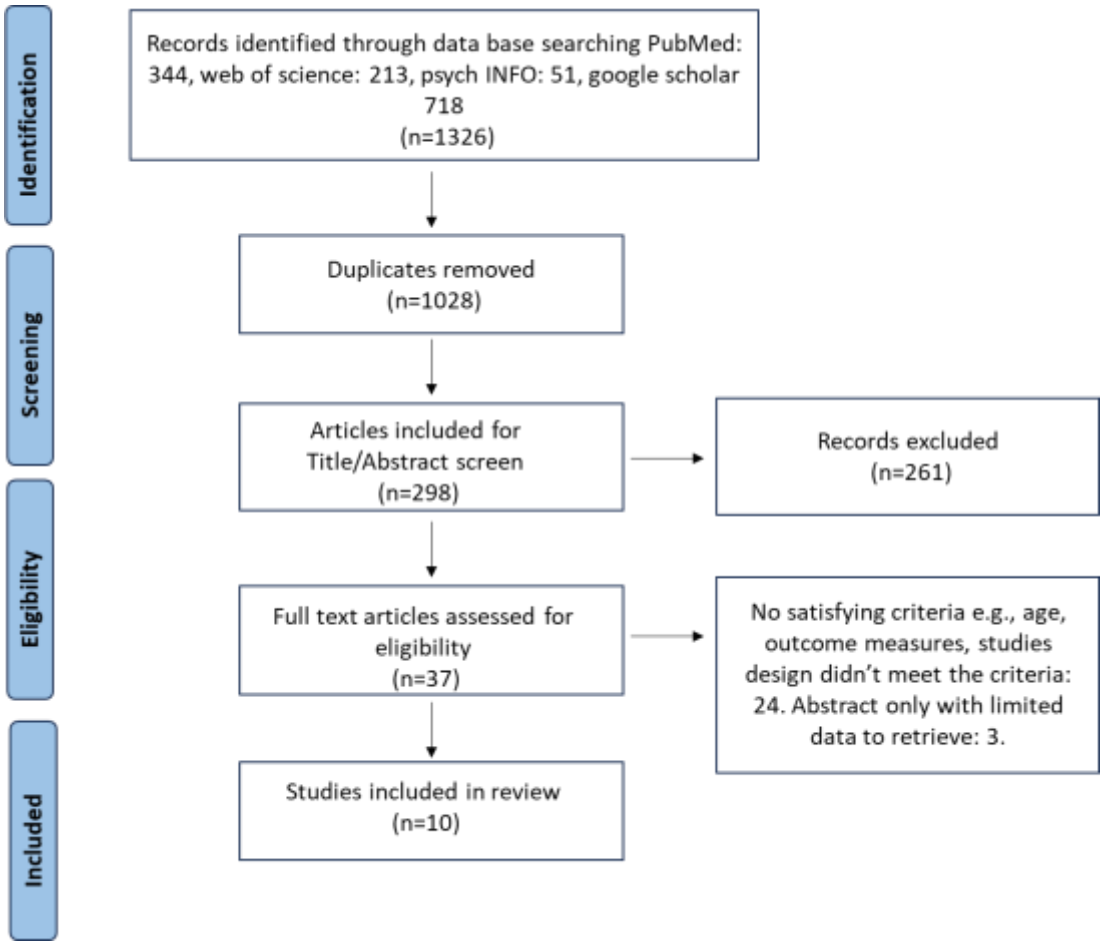
3. Methods (PRISMA-Style Flow)

3.1 Eligibility Criteria

The present review focused on adolescents aged 10–19 years, although studies including late adolescents or young adults were also considered if the majority of participants fell within the adolescent range. Eligible interventions were psychological or psychosocial in nature, encompassing cognitive behavioral therapy, family-based therapy, mindfulness programs, motivational interviewing, school-based initiatives, and group or parent-training approaches, including those delivered through online or blended modalities. Comparators included usual care, wait-list control conditions, educational or attention-based controls, and alternative psychological interventions (Figure 1).

Primary outcomes of interest were measures of problematic internet use, internet addiction, or gaming disorder severity and incidence, while secondary outcomes included indices of depression, anxiety, stress, coping ability, sleep quality, family functioning, and school performance. Eligible study designs comprised randomized controlled trials, cluster-randomised controlled trial (RCT)s, quasi-experimental studies, as well as systematic reviews and meta-analyses synthesizing such evidence. Studies were excluded if they focused solely on pharmacological interventions, adult-only populations, non-comparative designs, or non-psychological interventions unless psychological approaches were included as part of a combined analysis in meta-reviews.

Figure 1: PRISMA flow diagram [31]



3.2 Information Sources & Search

We searched PubMed/MEDLINE and PubMed Central through 15 September 2025 using terms for *adolescents*. We also retrieved meta-analyses and umbrella reviews on "digital addiction." Key, recent, high-quality sources informing this synthesis include Malinauskas et al. (2019) (psychological interventions in adolescents), Wang et al. (2024) (family-based therapy meta-analysis), Zhu et al. (2023) (network meta-analysis), Ayub et al. (2023) (children/adolescents RCTs) [34,35,36,37].

3.3 Study Selection & Flow

Title/abstract screening emphasized adolescent samples and psychological modalities. Full texts were reviewed when age range or intervention type was unclear. We prioritized (i) meta-analyses and umbrella reviews for quantitative signals and (ii) pivotal trials for context and implementation details.

3.4 Data Extraction & Synthesis

From trials/meta-analyses we extracted: sample characteristics, intervention type/dose/delivery, comparators, PIU/gaming measures, depression/anxiety metrics, effect sizes where reported, follow-up, and risk-of-bias signals. We present a structured narrative synthesis organized by intervention class and outcome domain.

3.5 Quality/Risk-of-Bias Considerations

We considered randomization and concealment (esp. cluster-designs), blinding (rare in psych trials), attrition, selective reporting (mental-health secondary outcomes under-reported), and cultural context (heavy East Asian representation). For overall certainty, we reflect GRADE-style judgments from included meta-analyses, noting frequent downgrades for inconsistency and indirectness.

Review of Literature

The intersection of internet addiction and cyberbullying has become a pressing issue in adolescent mental health research. This section provides a structured analysis of relevant studies categorized under key themes:

Lindenberg et al. (2022): Lindenberg and colleagues conducted a cluster randomized controlled trial to evaluate the PROTECT program, a cognitive–behavioral therapy (CBT)-oriented preventive intervention designed for adolescents at risk of internet use disorder. The study involved 422 high school students aged 12–18, who participated in four group sessions of 90 minutes each, facilitated by trained psychologists. The results demonstrated a significant reduction in internet use disorder symptoms, as assessed with the CSAS scale. In terms of mental health outcomes, the intervention produced a measurable decline in procrastination, while no significant improvements were observed in other psychological variables. Overall, the findings highlight that targeted CBT-based prevention can yield selective but meaningful benefits for adolescents vulnerable to problematic internet use [38].

Du et al. (2010): In this randomized trial, secondary school students with internet addiction received a school-based multimodal group CBT program. The intervention significantly reduced internet addiction severity and enhanced time management and self-regulation skills. Improvements were also seen in emotional, cognitive, and behavioral functioning, highlighting the potential of structured group CBT for adolescent populations [39].

Kim et al. (2018): Kim and colleagues conducted a small-scale pre–post study involving 17 adolescents with problematic internet use who participated in 10 sessions of group CBT. Results indicated notable reductions in internet addiction severity as well as decreases in depression and anxiety levels. Although limited by sample size, the study provides promising evidence for CBT's dual impact on behavioral and psychological well-being [40].

Nielsen et al. (2021): This randomized controlled trial explored multidimensional family therapy (MDFT) in 152 adolescents diagnosed with internet gaming disorder. MDFT led to significant reductions in both prevalence and severity of gaming disorder symptoms. Additionally, improvements were observed in family relationship functioning, underscoring the importance of family-based approaches in addressing internet-related behavioral disorders [41].

Horita et al. (2024): A feasibility trial was conducted to evaluate video-delivered CBT (vCBT) for parents of adolescents with internet addiction. While results on adolescents' outcomes were preliminary, the intervention proved feasible and showed early positive effects on reducing parental stress and improving parenting skills. The study highlights the value of parent-mediated strategies in managing internet addiction [42].

Otsuka et al. (2023): This cluster randomized controlled trial examined the effects of a school-based prevention program targeting problematic internet use among adolescents in Japan. The findings revealed no significant improvements in internet addiction or smartphone use scores. These results suggest that general awareness programs may not be sufficient without incorporating skill-based and individualized strategies [43] (Table 1].

Gaps in Literature and Future Directions

Despite extensive research on internet addiction and cyberbullying, significant gaps remain in understanding long-term effects, causality, and individual differences. Most studies rely on cross-sectional data, limiting insights into behavioral changes over time. Longitudinal research is needed to assess sustained impacts on mental health, academics, and social relationships. While the link between cyber-victimization and cyber-aggression is recognized, little is known about why some victims become perpetrators. Cultural, socioeconomic, and demographic factors remain underexplored. Parental attitudes, digital literacy, and coping mechanisms need further study. Research must also consider platform-specific risks. Future studies should evaluate interventions, protective factors, and targeted prevention strategies to mitigate psychological and social consequences.

Table 1: Studies on Internet Addiction

Study (year, country)	**Population**	**Intervention (dose; delivery)**	**IA outcomes (tools)**	**Mental-health outcomes**
Lindenberg et al., 2022 (Germany) [38]	At-risk high-school students, n=422, 12–18 y	**PROTECT** CBT-based indicated prevention; 4×90-min groups by psychologists	↓ symptom severity of gaming/unspecified IUD (CSAS)	Mixed: procrastination ↓; others ns
Du et al., 2010 (China) [39]	Secondary school students with IA, n≈ students (adolescents)	**Multimodal group CBT**; school-based	↓ IA; improved time management/self-regulation	Better emotional/cognitive/behavioral symptoms
Kim et al., 2018	Adolescents with problematic	**Group CBT** (10 sessions)	↓ IA severity	↓ depression/anxiety

(Korea) [40]	internet use, n=17			
Nielsen et al., 2021 (Europe) [41]	Adolescents with IGD, n≈152	**Multidimensional Family Therapy (MDFT)**	↓ IGD prevalence; ↓ symptoms	Family relationship functioning improved
Horita et al., 2024 (Japan) [42]	Parents of adolescents with IA (parent-mediated)	**vCBT for parents**; video-delivered	Feasible; early signals on adolescent IA	Parental stress/skills trends
Otsuka et al., 2023 (Japan) [43]	General school population (adolescents)	**School-based program** targeting PIU	**No improvement** in IA/smartphone scores	—
Schmidt et al., 2022 (Germany) [44]	Vocational-school youth with IUD risk	**Motivational Interviewing (brief)**	↓ problematic use (small-to-mod)	↑ readiness to change
Shirdel et al., 2025 (Iran) [45]	Adolescent girls, n (school-based)	**Theory of Planned Behavior–based education** (group sessions)	↓ Young's IA scores	Improved intention/self-control
Liu et al., 2015 (China) [46]	Adolescents with IA, n≈90	**Multi-family Group Therapy** (MFGT)	↓ IA severity	↑ family cohesion; ↓ conflict
PROTECT + early program (Germany) [47]	High-risk students	**Enhanced CBT school modules**	↓ symptoms trajectory	—

Discussion

The evidence supports a multi-pronged psychosocial strategy:

Evidence from the reviewed trials highlights several key insights into effective strategies for addressing internet addiction among adolescents. CBT, whether delivered in clinics or schools, consistently reduces IA and internet gaming disorder symptoms while improving self-regulation, with brief, indicated formats such as the PROTECT program demonstrating the ability to shift symptom trajectories at scale [48]. Strengths-based group approaches, including solution-focused and social-psychological interventions, further enhance self-efficacy, promote healthier behaviors, and support academic outcomes, offering practical, low-intensity options suitable for school settings. For adolescents with psychiatric comorbidities such as MDD or attention-deficit/hyperactivity disorder, combining psychotherapy with targeted pharmacotherapy appears to provide added benefits, reinforcing the importance of integrated care [50]. At a population level, digital coaching interventions and teacher-delivered media literacy curricula have demonstrated scalability and measurable effects in reducing problematic internet use and gaming patterns, making them viable for widespread prevention efforts. Finally, alternative modalities such as EA show preliminary promise, particularly in addressing impulsivity, but remain hypothesis-generating and require more rigorous evaluation before being considered for routine adoption.

Mechanisms and Theory

Findings align with models implicating executive control, reward salience, and emotion regulation in IA/IGD. Interventions that restructure cognitions, train attention/urge management, and build self-management routines plausibly interrupt compulsive cycles. Family/teacher involvement likely operates via environmental scaffolding, monitoring, and consistent contingencies.

Sources of Heterogeneity

Interpretation is complicated by terminology (IA/IGD/PIU), measurement diversity (IAT variants, IGD symptom counts), dosage/delivery variance, and population mix (adolescents vs. older youth). Standardized outcome sets, harmonized diagnostic criteria, and minimum follow-up windows (≥6–12 months) would enhance comparability and support future meta-analyses.

Practical Implications

- Schools are effective platforms for indicated prevention and group skills training.
- Stepped-care models can start with brief groups or app-coaching, escalating to CBT + family sessions for persistent/severe cases or comorbidity-informed packages when indicated.
- Parent engagement (rules, monitoring, support) is a consistent amplifier of effects.
- Equity considerations favor low-intensity, scalable options (teacher-led curricula, digital coaching) with cultural adaptation.

Limitations of the Evidence Base

Common constraints include limited blinding, short follow-up, single-site designs, and small samples in some trials. Diagnostic heterogeneity impedes synthesis; several studies rely on self-report without functional impairment metrics.

Conclusions

Psychological interventions work for adolescent PIU. CBT especially when delivered in accessible, school-based formats and family-based therapy demonstrate consistent, clinically meaningful reductions in PIU severity, with ancillary mental-health gains (notably depression and coping). Next-generation research should harmonize outcomes, extend follow-up, broaden geography, and test optimized, multi-component packages that blend individual skills with family and school ecology.

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