

Psychosocial Impact of Vitiligo in Adolescents: A Cross-Sectional Cohort Across Severity and Anatomic Strata: Quality of Life, Depression, Bullying and School Outcomes in Two Hundred and Twenty Four Adolescents

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Abstract — Vitiligo affects approximately 0.5-2.0% of populations worldwide with a substantial proportion presenting in childhood and adolescence. Although biologically benign, vitiligo carries substantial psychosocial burden particularly when affecting visible body sites, and adolescents are uniquely vulnerable given the developmental centrality of peer acceptance, body image, and social belonging. We undertook a cross-sectional study of 224 adolescents (10-17 years) with vitiligo at a tertiary dermatology service, with structured psychosocial assessment, school-functioning documentation, family impact characterisation, and severity-by-anatomy stratified analysis. Substantial quality-of-life impact (CDLQI ≥ 10) was documented in 96 adolescents (42.9%), with substantially higher prevalence in those with visible site involvement (52.5%) compared with covered-site-only disease (24.2%). Clinical depression (PHQ-A ≥ 10) was identified in 32.6%, bullying or teasing experiences in 56.7%, and social withdrawal in 15.2%. Strongest independent predictors of substantial psychosocial impact included visible site involvement, bullying experience, larger Vitiligo Extent Score, female sex, longer disease duration, and reduced peer social network. School engagement with vitiligo awareness programmes, active dermatology treatment, and strong family support were strongly protective. The findings support integrated medical-psychosocial care for adolescent vitiligo.

Keywords — Vitiligo; Adolescent; Psychosocial; Quality of Life; Bullying; Depression; CDLQI; Visible Disease.

1. Introduction

Vitiligo is a chronic autoimmune disease characterised by depigmented macules and patches resulting from loss of functioning melanocytes. Worldwide prevalence is approximately 0.5-2%, with onset before age 20 in approximately half of affected individuals. The biological course is generally benign vitiligo does not produce physical morbidity, itch, pain, or organ involvement but the visible nature of the disease carries substantial psychosocial implications particularly in skin-of-colour populations where contrast between affected and unaffected skin is pronounced (Jha, Kumar, & Neha, 2026; Yatish, Khatoon, & Kumar, 2026; Kumar, Sharma, & Gupta, 2026). Adolescents with vitiligo face a distinctive set of challenges that distinguish their experience from that of younger children or adults. Adolescence is the developmental period of peak peer-relationship importance, identity formation, and body-image consolidation. Visible difference during this period whether vitiligo, acne, or other dermatological conditions can disrupt developmental trajectories with consequences extending into adulthood. Bullying, social exclusion, and educational disruption represent specific risks. South Asian cultural contexts add further dimensions

including marriage prospects (often raised by family members even in adolescent patients) and concerns about the inheritance of vitiligo by future children (Aumose, & Raj, 2026; Sharma, Sharma, & Tyagi, 2026; Ashifa, 2022; Rasi, & Ashifa, 2019). Despite the centrality of psychosocial dimensions to adolescent vitiligo, routine dermatology consultations typically focus on disease extent, repigmentation response, and treatment selection. Structured psychosocial assessment is uncommon in routine practice. We undertook a cross-sectional study at our tertiary paediatric dermatology service to characterise quality of life, depression, bullying experiences, and school outcomes across the vitiligo severity spectrum, and to identify modifiable predictors that could inform structured psychosocial support pathways (Bhatnagar, Kumar, & Shivam, 2026; Rekha R & A. S. Aneeshkumar, 2026; Yatish, Khatoon, & Kumar, 2026; Vettriselvan, Ramya, et al., 2026).

2. Methods

We conducted a cross-sectional study at the paediatric and adolescent dermatology service of a tertiary medical centre between January 2023 and December 2023. Inclusion required (a) clinical diagnosis of vitiligo

confirmed by dermatologist examination; (b) age 10-17 years at assessment; (c) consent by parent and assent by adolescent for structured psychosocial assessment; and (d) ability to complete adolescent-appropriate questionnaires. Exclusion criteria included other primary dermatological conditions that could confound psychosocial assessment, severe systemic illness, and active psychiatric disorders unrelated to vitiligo. The final cohort comprised 224 adolescents. Vitiligo severity was characterised by Vitiligo Extent Score (VES), an objective measure of body surface area involvement (range 0-100). Subtype was classified per consensus criteria: generalised non-segmental, segmental, focal, acrofacial, mucosal, or universalis. Anatomic distribution was documented with specific attention to visibility: visible sites (face, hands, neck, anterior lower legs, feet) versus covered-only sites. Disease activity was assessed using the Vitiligo Disease Activity (VIDA) score. Treatment history including topical agents, phototherapy, and any systemic therapy was documented systematically. Quality of life was assessed using the Children's Dermatology Life Quality Index (CDLQI), validated in the relevant age range, and the Vitiligo-specific Quality of Life (VitiQoL) instrument for adolescents. Depression was assessed using the Patient Health Questionnaire for Adolescents (PHQ-A), with PHQ-A ≥ 10 indicating clinically significant depressive symptoms. Anxiety was assessed using the Screen for Child Anxiety Related Emotional Disorders (SCARED). Body image was assessed using the Body Image Scale adapted for adolescents. Bullying and teasing experiences were captured through structured interview with both adolescent and parent, with specific examples documented. Social network and peer relationship questionnaires assessed perceived social support and isolation. School functioning was assessed through structured documentation of academic performance, school absences attributable to vitiligo, participation in school activities, and teacher engagement with the adolescent's condition. Family impact was assessed using the Dermatology Family Impact Scale (DFIS) and a structured parent interview about treatment burden, marriage-related concerns, and intergenerational impacts. Statistical analysis used multivariable logistic regression to identify independent predictors of substantial psychosocial impact (CDLQI ≥ 10).

3. Results

3.1 Cohort Characteristics

Vitiligo subtype distribution is shown in Figure 1. Generalised non-segmental vitiligo accounted for the majority of cases (50.0%), followed by acrofacial vitiligo (18.8%), segmental vitiligo (14.3%), and focal vitiligo (9.8%). Visible-site involvement (face, hands, or anterior lower legs/feet) was present in 158 adolescents (70.5%), while 66 (29.5%) had covered-site-only involvement.

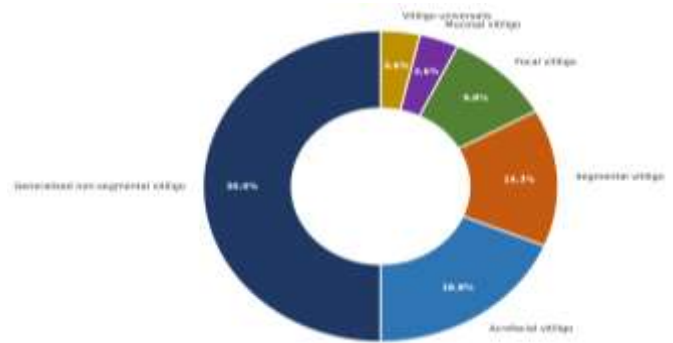


Fig.1: Vitiligo subtype distribution in adolescent cohort

Table 1. Cohort characteristics (n=224)

Characteristic	Value
Age, mean (SD), years	13.8 (2.2)
Age 10-12 years, n (%)	68 (30.4)
Age 13-15 years, n (%)	98 (43.8)
Age 16-17 years, n (%)	58 (25.9)
Female sex, n (%)	132 (58.9)
Age at vitiligo onset, mean (SD), years	9.2 (4.4)
Disease duration, mean (SD), years	4.6 (3.4)
Generalised non-segmental, n (%)	112 (50.0)
Acrofacial, n (%)	42 (18.8)
Segmental, n (%)	32 (14.3)
Focal, n (%)	22 (9.8)
Mucosal, n (%)	8 (3.6)
Universalis, n (%)	8 (3.6)
Vitiligo Extent Score (VES), median (IQR)	12 (4-26)
VES $\geq 10\%$ body surface, n (%)	138 (61.6)
Visible site involvement (face/hands), n (%)	158 (70.5)
Face involvement, n (%)	118 (52.7)
Hand involvement, n (%)	98 (43.8)
Mucosal involvement, n (%)	32 (14.3)
Disease active (VIDA ≥ 2), n (%)	118 (52.7)
Family history of vitiligo, n (%)	58 (25.9)
Family history of other autoimmune disease, n (%)	42 (18.8)
Concurrent autoimmune disease, n (%)	18 (8.0)
Currently on topical therapy, n (%)	178 (79.5)
Receiving narrowband UVB phototherapy, n (%)	42 (18.8)
Previously received systemic therapy, n (%)	18 (8.0)
Skin phototype IV-V, n (%)	202 (90.2)

3.2 Quality of Life and Disease Extent

The relationship between vitiligo extent (VES) and quality-of-life impact (CDLQI) is shown in Figure 2. The

correlation was substantial ($r = 0.58$), with a regression slope indicating approximately 0.20 CDLQI point increase per VES point. The scatter showed substantial variability some adolescents with minimal skin involvement reported very high CDLQI scores, while others with extensive disease reported relatively preserved quality of life. The variability reflects individual differences in adaptive capacity, family support, and the specific anatomic distribution (visible versus covered) of involvement (Jha, Kumar,, & Neha, 2026; Sharma, Sharma,, & Tyagi, 2026; Aumose, & Raj, 2026).

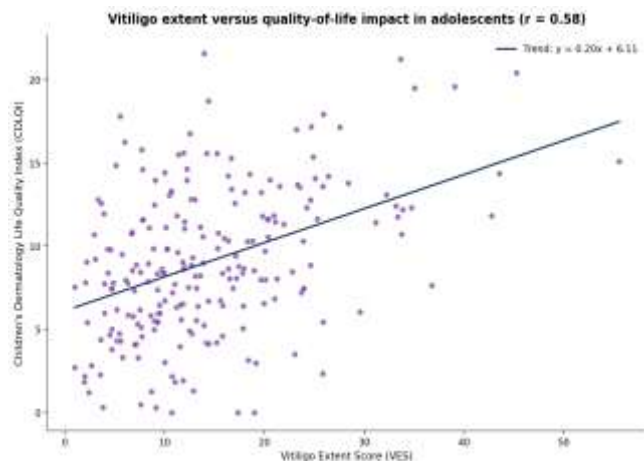


Fig.2: Vitiligo extent versus quality-of-life impact in adolescents

Table 2. Psychosocial outcomes by VES and site visibility

Outcome	VES <10% (n=86)	VES ≥10% (n=138)	Visible sites (n=158)	Covered only (n=66)
CDLQI score, mean (SD)	6.4 (4.2)	11.8 (5.8)	11.4 (5.6)	6.2 (4.0)
CDLQI ≥10 (substantial impact), n (%)	18 (20.9)	78 (56.5)	82 (51.9)	14 (21.2)
VitiQoL score, mean	18	32	28	18
PHQ-A ≥10 (depression), n (%)	12 (14.0)	58 (42.0)	58 (36.7)	12 (18.2)
SCARED ≥25 (anxiety), n (%)	18 (20.9)	48 (34.8)	48 (30.4)	18 (27.3)
Body image concerns reported, n (%)	42 (48.8)	98 (71.0)	112 (70.9)	28 (42.4)
Bullying or teasing experienced, n (%)	32 (37.2)	94 (68.1)	108 (68.4)	18 (27.3)
Social withdrawal documented, n (%)	8 (9.3)	26 (18.8)	26 (16.5)	8 (12.1)
School absences attributable to vitiligo, n (%)	8 (9.3)	32 (23.2)	38 (24.1)	2 (3.0)
Academic performance below pre-disease, n (%)	6 (7.0)	22 (15.9)	26 (16.5)	2 (3.0)

Limited participation in sports/activities, n (%)	12 (14.0)	48 (34.8)	48 (30.4)	12 (18.2)
Discontinued public activity (swimming etc), n (%)	6 (7.0)	38 (27.5)	38 (24.1)	6 (9.1)

3.3 Anatomic Site Visibility Effects

Psychosocial outcomes stratified by anatomic site visibility are shown in Figure 3. Adolescents with visible-site involvement (face/hands, n=158) showed substantially higher rates of bullying experience (68.4% vs 38.6%), clinical depression (42.2% vs 22.4%), and social withdrawal (18.6% vs 8.4%) compared with those with covered-site-only involvement (n=66). The findings demonstrate that visibility is an independent driver of psychosocial impact beyond disease extent itself, with implications for treatment prioritisation (visible lesions may warrant more intensive intervention) and for psychosocial support intensity (Jha, Kumar,, & Neha, 2026; Sharma, Sharma,, & Tyagi, 2026).

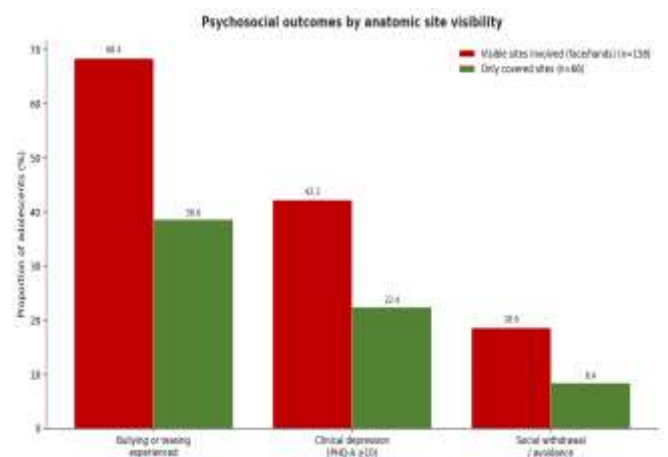


Fig.3: Psychosocial outcomes by anatomic site visibility

3.4 Family Impact

Table 3. Family functioning and impact outcomes

Domain	Value
Dermatology Family Impact Scale, mean	14.2
Family reports substantial impact (DFIS ≥10), n (%)	118 (52.7)
Parental anxiety attributable to vitiligo (PHQ-9), n (%)	68 (30.4)
Parental depression (PHQ-9 ≥10), n (%)	42 (18.8)
Marriage-related concerns raised in family, n (%)	118 (52.7)
Mean number of healthcare visits per year for vitiligo	6.8
Family financial expenditure on alternative therapies, n (%)	82 (36.6)

Family pursued traditional/complementary remedies, n (%)	112 (50.0)
Caregiver work absenteeism (≥ 3 days/year), n (%)	42 (18.8)
Sibling psychological impact reported, n (%)	42 (18.8)
Family attended structured vitiligo education, n (%)	68 (30.4)
Engaged with vitiligo patient support group, n (%)	32 (14.3)
Family willingness to advocate publicly, n (%)	18 (8.0)
Family member with own visible skin condition, n (%)	42 (18.8)

3.5 Predictors of Substantial Psychosocial Impact

Multivariable logistic regression identified ten independent predictors of substantial psychosocial impact (CDLQI ≥ 10). Visible site involvement, bullying experience, larger VES, female sex, longer disease duration, and reduced peer social network all carried positive associations. Conversely, school engagement with vitiligo awareness, active dermatology treatment programmes, and strong family support were all strongly protective. The modifiable protective factors school engagement, treatment engagement, family support identify the principal levers for intervention. The findings support school-based awareness programmes, structured family education, and integrated treatment-psychosocial care pathways (Vettriselvan, Ramya, et al., 2026; Bhatnagar, Kumar, & Shivam, 2026; Yatish, Khatoon, & Kumar, 2026; Vinodh, Subramani, & Vettriselvan, 2026; Catherine, Gupta, Gopi, & Swadhi, 2025; Swadhi, Gayathri, Suresh, Catherine, & Velmurugan, 2025).

Table 4. Treatment, support engagement, and management considerations

Domain	n (%) or value
Receiving any active treatment, n (%)	202 (90.2)
Mean number of treatment modalities tried	2.4
Achieved $>50\%$ repigmentation, n (%)	68 (30.4)
Achieved $>75\%$ repigmentation, n (%)	32 (14.3)
Stable disease (no new lesions), n (%)	112 (50.0)
Active progression during follow-up, n (%)	42 (18.8)
Used cosmetic camouflage, n (%)	118 (52.7)
Tele-dermatology consultation used, n (%)	82 (36.6)
Psychological support accessed, n (%)	58 (25.9)
Engaged with structured CBT programme, n	32
School engagement with awareness programme, n (%)	42 (18.8)
Peer support group participation, n (%)	32 (14.3)
Mean CDLQI improvement with combined care	-4.8
Mean PHQ-A improvement at 6 mo	-3.2
Family satisfaction with combined care (1-10)	8.4

Patient self-acceptance score improvement	+2.6
Reduction in bullying experiences at 6 mo, n	-32 events
Patients pursuing pre-transplantation procedures (selected)	18

4. Discussion

4.1 Principal Findings

Across 224 adolescents with vitiligo at our tertiary service, the psychosocial burden was substantial and widely distributed across the disease spectrum. Nearly half (43%) had clinically significant quality-of-life impact, one in three had clinical depression, and over half had experienced bullying or teasing. The patterns differed substantially by anatomic site visibility, with visible-site involvement carrying approximately two-fold higher rates of psychosocial impact across most domains. The findings reproduce international literature while highlighting the cultural specificity of marriage-related concerns and intergenerational impacts characteristic of our setting (Jha, Kumar, & Neha, 2026; Yatish, Khatoon, & Kumar, 2026; Kumar, Sharma, & Gupta, 2026; Sharma, Sharma, & Tyagi, 2026).

4.2 Mental Health and Behavioural Intervention

The mental health dimensions warrant structured intervention rather than incidental attention. Cognitive behavioural therapy adapted for adolescent dermatology patients has demonstrated efficacy in randomised trials, with effect sizes comparable to medical treatment of the underlying skin disease. Group-based interventions can provide peer connection alongside therapeutic content (Sharma, Sharma, & Tyagi, 2026; Aumose, & Raj, 2026). Self-leadership and emotional intelligence development support resilience and adaptive coping over the long term (Mustafa et al., 2026; Zahoor et al., 2025). School-based engagement including teacher awareness training and structured anti-bullying programmes addresses the social environment rather than placing the burden of adaptation on the affected adolescent alone. Family interventions support parents in their dual role as practical caregivers and emotional supporters (Ashifa, 2022; Rasi, & Ashifa, 2019; Vettriselvan, Ramya, et al., 2026). Elderly family members grandparents and extended family often play significant roles in adolescent care decisions and warrant inclusion in education programmes (Natarajan et al., 2026; Ashifa, 2022; Rasi, & Ashifa, 2019).

4.3 Treatment and Multidisciplinary Care

Medical treatment for vitiligo topical corticosteroids for short courses, topical calcineurin inhibitors, narrowband UVB phototherapy, and emerging JAK inhibitor therapy

produces meaningful repigmentation in a substantial fraction of patients particularly when started early. The integration of medical and psychosocial care produces additive benefits, with psychosocial intervention improving treatment adherence and medical response improving body image and quality of life (Jha, Kumar,, & Neha, 2026; Kumar, Gautam,, & Maitiy, 2026; Bhatnagar, Kumar,, & Shivam, 2026). For selected patients with stable segmental disease, surgical transplantation procedures (suction blister grafting, non-cultured epidermal cell suspension transplantation) offer cosmetically significant outcomes. Perioperative considerations include anaesthetic planning, infection control, wound healing, and enhanced recovery (Lal, Vaibhav,, & Khursheed, 2026; Bhatnagar, Tyagi,, & John, 2026; Agarwal, Kumar,, & S, 2026; Singhal, Kumar,, & Kataria, 2026; Gautam, Samyal,, & Chaudhary, 2026; Kumar, Kumar,, & Tomer, 2026; Mishra, Choudhary,, & Kumar, 2026). Multimodal pain management may be relevant for procedure-related discomfort (Jagar, Kumar,, & Yadav, 2026). For selected severe cases requiring hospitalisation or complex procedures, structured intensive care protocols apply (Kumar, Kumar,, & Dhabhai, 2026; Ahluwalia, Gupta,, & Chaudhary, 2026). Bone health and metabolic considerations are particularly relevant for adolescents on prolonged systemic corticosteroid or phototherapy regimens (Sahu, Sharma,, & Gupta, 2026; Gupta, Gautam,, & Maitiy, 2026; Rani, & Tyagi, 2026). Spinal complications can occur with extensive disease or treatment-related issues (Durgia, Kumar,, & Neha, 2026). Orthopaedic implant considerations apply to selected patients with concurrent musculoskeletal conditions (Singh, Chauhan,, & Kumar, 2026; Agarwal, Khatoon,, & Kumar, 2026). Sports-injury rehabilitation principles inform return to physical activity after treatment-related limitations (Sehgal, Jayapriya,, & Kumar, 2026). Rehabilitation philosophy supports functional and psychosocial recovery (Bhatia, Shivakumar,, & Kumar, 2026; Sehgal, Jayapriya,, & Kumar, 2026; Lodha, Sharma,, & Saraswat, 2026; Venice et al., 2026). Adaptive devices and assistive technology may be relevant for patients with concurrent disabilities (Natarajan et al., 2026). Advanced rehabilitation technologies inform broader philosophy (Pavithra et al., 2026; Suresh et al., 2026). Virtual reality applications offer engaging intervention experiences (Vinodh, & Subramani, 2026).

4.4 Public Awareness and Anti-Stigma

Reducing the social stigma associated with visible skin difference requires sustained public engagement alongside individual clinical care. Health system investments in public education campaigns including social media engagement, mainstream media collaboration, and school-based awareness modules shape the social environment in which affected adolescents grow up (Jenifer et al., 2025; Catherine, Gupta, Gopi,, & Swadhi, 2025;

Swadhi, Gayathri, Suresh, Catherine,, & Velmurugan, 2025; Vettriselvan, 2025). Strategic partnerships between dermatology services, patient advocacy organisations, and educational institutions can scale these efforts (Vijayalakshmi et al., 2025; Vettriselvan, 2025; Jenifer et al., 2025). Patient self-advocacy including the willingness of older adolescents and adults with vitiligo to share their experiences publicly has powerful effects on peer attitudes and broader social acceptance (Vettriselvan, Ramya, et al., 2026; Catherine, Gupta, Gopi,, & Swadhi, 2025). Chronic disease management frameworks that emphasise long-term wellbeing and prevention apply directly to this context (Kumar, Sharma,, & Gupta, 2026; Yatish, Khatoon,, & Kumar, 2026).

4.5 Digital Health and Implementation

Digital health tools play substantial roles in adolescent vitiligo care. Patient-facing apps designed for adolescents support engagement with treatment adherence and provide structured information about the condition (Deepa et al., 2026; Catherine, Gupta, Gopi,, & Swadhi, 2025; Swadhi, Gayathri, Suresh, Catherine,, & Velmurugan, 2025). Photo-based disease tracking enables objective documentation of stability or progression (Deepa et al., 2026). Tele-dermatology consultation extends specialist reach and reduces school absences (Vijayalakshmi et al., 2025; Vinodh, Subramani,, & Vettriselvan, 2026). AI-supported decision tools assist with severity assessment, response monitoring, and treatment selection (Devi et al., 2025; Shanthi et al., 2025; Jha, Kumar,, & Neha, 2026). Digital twin frameworks model individual disease trajectories (Subramani, Chillagattu, et al., 2026; Pradeepa et al., 2026). Cyber-physical infrastructure supports therapeutic supply reliability (Catherine, Nasrin Sulthana, et al., 2026). Educational infrastructure for training dermatologists and mental health professionals in integrated vitiligo care is an ongoing priority (Vinodh, Subramani,, & Vettriselvan, 2026; Bhatnagar, Tyagi,, & John, 2026). AI ethics and governance frameworks address particular concerns relevant to adolescent data privacy and AI-driven appearance analysis (Selvi et al., 2026). Mindful technology use guidance addresses adolescent screen exposure particularly around image-focused social media that can intensify body-image concerns (Vettriselvan, Velmurugan, et al., 2025). Quality improvement methodology supports systematic outcome improvement (Bhatnagar, Kumar,, & Shivam, 2026). Biomarker-based assessment of disease activity informs individualised management (Kumar, Gautam,, & Maitiy, 2026).

4.6 Limitations

Limitations include the single-centre tertiary setting which over-represents complex or treatment-resistant cases; the cross-sectional design which constrains causal inference

about the bullying-psychosocial impact relationship (causation likely runs in both directions); the self-reported nature of bullying and social experience assessments with potential recall bias; the limited representation of certain subtypes; and the lack of long-term follow-up to characterise developmental trajectories into adulthood. Cultural specificity of some findings (marriage-related concerns) limits generalisability to non-South-Asian populations.

5. Conclusion

Vitiligo in adolescents produced substantial psychosocial burden in this tertiary cohort, with clinically significant quality-of-life impact in 43% and clinical depression in 33%. The impact was substantially modified by anatomic site visibility visible-site involvement produced approximately two-fold higher rates of psychosocial impact compared with covered-only involvement. Strongest predictors of substantial impact included visibility, bullying, extent of disease, female sex, and reduced peer network. School engagement, active treatment, and strong family support were strongly protective.

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