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A Comparative Study of Social Intelligence and Social Adjustment Skills in Children and Adolescents with and without Vitiligo

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Abstract

Background: Vitiligo is a chronic skin disorder that can significantly affect psychosocial development, especially when it starts in childhood or adolescence. Visible skin changes can lead to social stigma, emotional distress, and difficulties in social interaction.

Objective: This study aimed to compare social intelligence and social adjustment skills between children and adolescents with vitiligo and their healthy peers.

Methods: A matched case-control design was used including 88 participants aged 10–18 years (44 with vitiligo and 44 controls). Participants completed the Tromsø Social Intelligence Scale and the California Social Adjustment Questionnaire. Statistical analyses, including independent t-tests and multivariate analysis of variance (MANOVA), were performed to assess group differences across total and subscale scores.

Results: Children and adolescents with vitiligo exhibited significantly lower social intelligence and adjustment than controls across all assessed subdomains ($p < 0.05$).

Conclusion: Vitiligo may impair crucial aspects of social functioning during developmental years, likely due to a combination of psychosocial factors such as stigma and emotional distress. Integrating psychosocial support and social skills training into the clinical management of pediatric vitiligo may enhance resilience and well-being. Further studies with more diverse populations are needed to examine cultural influences and confirm these findings.

Key Words: Adolescent; Child; Social Adjustment; Social Intelligence; Vitiligo.

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1- INTRODUCTION

Vitiligo is a chronic dermatological disorder characterized by the destruction of melanocytes, the pigment-producing cells in the skin, resulting in depigmented macules (1). Although the condition is not physically life-threatening, it carries significant psychological and social burdens, especially when it begins in childhood or adolescence (2). These life stages are characterized by heightened sensitivity to peer approval and the development of self-concept, making individuals particularly vulnerable to the psychosocial consequences of visible differences (3, 4). Epidemiological studies estimate that vitiligo affects approximately 0.5% to 2% of the global population, with a substantial proportion occurring during the first two decades of life (5). In many cultural contexts, including those in which physical appearance influences social value, children and adolescents with vitiligo may experience bullying, social exclusion, and reduced self-esteem (6). Despite advances in clinical management, the psychological impact of vitiligo often persists, indicating that medical treatment alone may not fully address patients' psychosocial needs (7, 8).

Although a growing body of research has examined the emotional consequences of vitiligo, including anxiety, depression, and reduced quality of life, limited attention has been given to the specific social competencies that influence adaptation to the condition (9, 10). Most existing studies emphasize broad emotional outcomes rather than the social skills involved in daily functioning, such as social adjustment and social intelligence (8). Social adjustment refers to an individual's ability to establish and maintain appropriate social roles and relationships, while social intelligence reflects the capacity to understand and manage social interactions effectively (11). These variables are particularly relevant in children and adolescents, whose social skills are still developing and whose environments often demand high levels of peer interaction and social conformity (12). Previous studies in healthy and clinical populations have shown that higher levels of social adjustment and social intelligence are associated with better psychological resilience, lower stress, and improved overall well-being (13). However, to date, no study has directly compared these competencies between children and adolescents with vitiligo and their healthy peers, leaving this specific comparison unaddressed in prior research.

Taken together, these considerations highlight the need for a more nuanced exploration of psychosocial functioning in children and adolescents with vitiligo. Given the established impact of chronic visible conditions on psychosocial development and the central role of social competence in adaptation, investigating these specific skills in youth with vitiligo is crucial. Therefore, this study aims to directly compare social intelligence and social adjustment in a clinical sample of children and adolescents with vitiligo against age-matched healthy peers. Identifying potential differences in these core social competencies can provide a foundational evidence base for developing targeted interventions that move beyond symptom management to foster social resilience and improve the overall quality of life in this population.

2- MATERIALS AND METHODS

2-1. Study Design and Participants

This case-control study was conducted during the last quarter of 2024 at the dermatology clinic of Imam Reza Hospital in Mashhad. A total of 88 participants aged 10 to 18 years were recruited, including 44 children and adolescents diagnosed with vitiligo and 44 healthy controls. The sample size was determined based on the Krejcie and Morgan table (14). Sampling was conducted by inviting all eligible children and adolescents with vitiligo who visited the clinic during this period and were willing to participate. The control group was selected using purposive sampling from the first-degree relatives of other vitiligo patients (not the participants themselves) to match participants in terms of age, gender, parents’ marital status, socioeconomic background, and education level. This matching strategy was deliberately chosen to control for potential confounding effects of shared familial, socio-cultural, and environmental factors that could independently influence social development and adjustment. The aim was to isolate the effect of vitiligo from these broader contextual variables. No blinding was performed in this study.

For the vitiligo group, an additional clinical criterion was applied: only patients with visible lesions on socially sensitive areas (face, hands, or both) were included to increase the likelihood of experiencing a psychosocial impact. Patients with lesions confined to covered areas (e.g., trunk) were not recruited. All vitiligo participants were undergoing topical treatment (corticosteroids or calcineurin inhibitors) at the time of the study. However, standardized measures of disease severity (e.g., VASI) and structured clinical interviews for psychiatric comorbidities were not employed due to the study's primary focus on psychosocial self-report and feasibility constraints.

2-2. Inclusion and Exclusion Criteria

Inclusion criteria for the vitiligo group were having a clinical diagnosis of vitiligo confirmed by a dermatologist, aged between 10 and 18 years, and having the ability to understand the questionnaire items. Inclusion criteria for the control group were having no history of vitiligo or other skin diseases, being a first-degree relative of a vitiligo patient, being within the age range of 10 to 18 years and being able to comprehend the questionnaire items. The exclusion criteria for both groups included: 1. having any other chronic dermatological (e.g., psoriasis, atopic dermatitis) or systemic illness with potential psychosocial impact (e.g., diabetes, autoimmune disorders); 2. having a diagnosed psychiatric or neurodevelopmental disorder (e.g., major depressive disorder, autism spectrum disorder) based on medical records or parental report; 3. currently using psychotropic medications; 4. being unable to read or comprehend the questionnaire items; and 5. unwillingness to participate or providing incomplete data.

2-3. Procedure and Measures

Following initial contact by clinic staff, informed consent was obtained from both parents and participants. Subsequently, the questionnaires were distributed electronically via the Google Forms online platform. As an incentive for participation, a free social skills training session was offered upon completion of the study. Two validated self-report instruments were administered electronically:

1. The Tromsø Social Intelligence Scale (TSIS): This scale consists of 21 items designed to measure three dimensions of social intelligence: social information processing (7 items), social skills (6 items), and social awareness (8 items). Participants respond on a 7-point Likert scale ranging from 1 ("Describes me very poorly") to 7 ("Describes me very well"). The total score ranges from 21 to 147, with higher scores indicating greater social intelligence (15). The scale has demonstrated good reliability in Iranian populations,

with reported Cronbach's alpha coefficients ranging from 0.81 to 0.84 (16).

2. The California Social Adjustment Questionnaire: This questionnaire comprises 40 dichotomous (Yes/No) items that assess an individual's adjustment across three primary domains: peer relationships, school relationships, and family relationships. The total score ranges from 0 to 40, where a higher score indicates a better level of social adjustment. Its reliability has been confirmed in previous Iranian studies, with Cronbach's alpha coefficients reported between 0.77 and 0.80 (17).

2-4. Statistical Analysis

Data were analyzed using SPSS version 22. Descriptive statistics (mean, median, standard deviation, variance) were reported. Preliminary analyses were conducted to ensure no violation of the assumptions of normality, homogeneity of variances, and multicollinearity. Independent samples t-tests were used to compare group means on the main variables (social intelligence and adjustment totals) and on each subscale. A Bonferroni correction was applied to control for Type I error when comparing the six subscales. Effect sizes were reported using Cohen's d.

2-5. Ethical Considerations

The study was approved by the Ethics Committee of Imam Reza Hospital (Code: 1403.27.REC.IMAMREZA.IR). Written informed consent was obtained from all participants and their guardians. Confidentiality was ensured, and participation was voluntary at all stages. Participants were offered a free social skills training session as an incentive.

3-RESULT

This study aimed to evaluate the social intelligence and social adjustment capabilities of children and adolescents with vitiligo, taking into account the psychosocial impact of the disease on their daily interactions and quality of life.

3-1. Study Sample and Demographic Data

A total of 88 participants (44 with vitiligo and 44 healthy controls) were included in the final analysis. The two groups were matched by age and gender. The mean age (±SD) of the total sample was 12.1 ± 2.3 years. No participants were excluded during the study. Demographic characteristics of the participants are summarized in Table 1. As shown in the table, in the vitiligo group, 43.2% were boys and 56.8% were girls, while in the control group, 40.9% were boys and 59.1% were girls.

Clinical Characteristics of the Vitiligo Group: A structured clinical checklist was completed by the attending dermatologist for each participant. Regarding lesion distribution, 61.4% (n=27) had lesions involving the face (including periorbital or perioral areas), 25.0% (n=11) had lesions on the hands (primarily dorsal surfaces), and 13.6% (n=6) had involvement of both face and hands. No participants had lesions confined solely to covered areas (e.g., trunk). Based on the physician's global assessment of depigmented area and disease activity, severity was categorized as mild in 50.0% (n=22), moderate in 36.4% (n=16), and severe in 13.6% (n=6). The mean self-reported disease duration was 4.1 (± 2.8) years. All participants were on a stable regimen of topical therapy (either mid-potency corticosteroids or calcineurin inhibitors).

Table-1. Demographic Characteristics of Participants by Group.

Variable	Category	Vitiligo Group (n=44)	Control Group (n=44)
Gender, n (%)	**Boy**	19 (43.2%)	18 (40.9%)
	Girl	25 (56.8%)	26 (59.1%)
Mean age (years), (SD)		12.2 (2.4)	12.0 (2.2)
Age Range		10-18	10-18
Disease Duration (years), Mean (SD)		4.1 (2.8)	--

3-2. Descriptive Findings

The descriptive statistics for the two groups in terms of social intelligence and social adjustment are presented in Table 1. A visual comparison of the mean scores suggests lower scores in both social intelligence and its dimensions, as well as in social adjustment and its subscales, among participants with vitiligo compared to controls.

Table-2. Descriptive Statistics for Social Intelligence and Adjustment Scores by Group.

Variable	Vitiligo Group (n=44)	Control Group (n=44)
Social Intelligence (Total)	90.3 (15.0)	109.2 (18.0)
Social Information Processing	32.5 (6.5)	38.0 (6.0)
Social Skills	23.8 (5.2)	30.5 (5.8)
Social Awareness	34.0 (7.0)	40.7 (7.5)
Social Adjustment (Total)	21.2 (5.8)	28.5 (5.5)
Peer Relationships	4.4 (2.1)	5.9 (2.4)
School Relationships	4.7 (1.8)	6.8 (2.2)
Family Relationships	6.0 (2.1)	7.7 (1.8)

Note: Data presented as Mean (Standard Deviation).

3-3. Primary Analysis

To compare the main variables between the two groups, independent samples t-tests were conducted. As shown in Table 3, the mean score of social intelligence in the vitiligo group (M = 90.3, SD = 15.0) was significantly lower than in the control group (M = 109.2, SD = 18.0); t(86) = -5.54, p < 0.001, Cohen's d = 1.18. Similarly, the mean score of social adjustment was significantly lower in the vitiligo group (M = 21.2, SD = 5.8) compared to the control group (M = 28.5, SD = 5.5); t(86) = -6.07, p < 0.001, Cohen's d = 1.29.

Table-3. Independent Samples t-Test Results Comparing Groups on Main Variables.

Variable	Group	Mean	SD	t(86)	p-value	Cohen's *d*
Social Intelligence	**Vitiligo**	90.3	15.0	-5.54	< .001	1.18
	Control	109.2	18.0			
Social Adjustment	**Vitiligo**	21.2	5.8	-6.07	< .001	1.29
	Control	28.5	5.5			

3-4. Secondary Analysis

To examine group differences on each of the six subscales of social intelligence and social adjustment, separate independent samples t-tests were conducted. A Bonferroni correction was applied to control for the family-wise error rate due to multiple comparisons, setting a stringent significance threshold at p<0.0083 (0.05/6). The results are presented in Table 4. As shown, the vitiligo group scored significantly lower than the control group on all three subscales of social intelligence: Social Information Processing (t(86)= -4.23, p < 0.001), Social Skills (t(86)= -5.90, p <

0.001), and Social Awareness (t(86)= -4.52, p < 0.001). Similarly, significant differences were found on all three subscales of social adjustment: Peer Relationships (t(86)= -3.18 ,p = 0.002), School Relationships (t(86)= -4.98, p < 0.001), and Family Relationships (t(86)= -4.16, p < 0.001). All differences remained significant after the Bonferroni correction, with effect sizes ranging from medium to large (Cohen's d = 0.68 to 1.26).

Table-4. Independent Samples t-Test Results for Subscales with Bonferroni Correction.

Dependent Variable (Subscale)	Vitiligo Mean (SD)	Control Mean (SD)	t(86)	p-value	Sig. after Bonferroni (α < .0083)	Cohen's *d*
Social Information Processing	32.5 (6.5)	38.0 (6.0)	-4.23	< 0.001	Yes	0.90
Social Skills	23.8 (5.2)	30.5 (5.8)	-5.90	< 0.001	Yes	1.26
Social Awareness	34.0 (7.0)	40.7 (7.5)	-4.52	< 0.001	Yes	0.96
Peer Relationships	4.4 (2.1)	5.9 (2.4)	-3.18	0.002	Yes	0.68
School Relationships	4.7 (1.8)	6.8 (2.2)	-4.98	< 0.001	Yes	1.06
Family Relationships	6.0 (2.1)	7.7 (1.8)	-4.16	< 0.001	Yes	0.89

Note: Bonferroni-corrected significance level: $\alpha = .05/6 = .0083$.
All p-values remain significant after this strict correction.

4- DISCUSSION

The findings of this case-control study demonstrate that children and adolescents with vitiligo report significantly lower levels of social intelligence and social adjustment compared to their demographically matched healthy peers. In addition to the main findings, analyses of individual subscales (using independent t-tests with Bonferroni correction) revealed significant group differences across multiple dimensions of social intelligence and social adjustment. Specifically, children and adolescents with vitiligo scored significantly lower in social information processing, social skills, and social awareness. Furthermore, they also exhibited lower functioning in peer, school, and family relationships. These findings underscore the pervasive impact of vitiligo on psychosocial development, suggesting that the condition can detrimentally affect both global social competence and the specific skills necessary for successful social integration during critical developmental periods. It is noteworthy that our clinical sample comprised individuals with lesions in highly visible areas (face and/or hands), which are known to be most strongly associated with stigma and social anxiety. This strengthens the plausibility that the observed social difficulties are linked to the visibility of the condition. It is important to note that while the social intelligence scores of the vitiligo group were significantly lower than their healthy peers, the absolute mean (90.3) falls within a moderate range. This suggests that the primary challenge may not be an absolute lack of social cognitive ability, but rather a relative impairment that significantly hinders their social functioning and self-perception compared to the normative social environment of their peers.

These findings are consistent with several recent studies that have examined the psychosocial burden of chronic and visible skin diseases in pediatric populations. A 2021 systematic review by Ezzedine et al. highlights that vitiligo significantly affects psychosocial well-being, including aspects related to social functioning. The extent of psychosocial comorbidities supports the use of multidisciplinary treatment strategies to address the vitiligo-associated burden of disease (8). Similarly, a 2023 study on Korean adolescents with vitiligo demonstrated that the visibility of the disease can negatively affect self-perception and social image, leading to diminished social functioning (4). In line with this, a 2025 systematic review by Fuentes-Barragán et al. examined the impact of atopic dermatitis, which is a chronic dermatological condition, on major life-changing decisions (MLCDs). The study found that children with these visible skin diseases often face significant challenges in areas such as clothing choices, lifestyle, sports participation, and social interactions (18). Moreover, a 2016 study by Santos et al. found that 13–18% of adolescents with chronic conditions reported reduced participation in school and social activities. These adolescents had lower psychosocial scores, including health-related quality of life, resilience, and social support, compared to their peers. This suggests that chronic health conditions can negatively affect social engagement and relationship-building (19). Besides that, children with chronic physical illnesses tend to show lower levels of academic, physical, and social functioning, as confirmed by a meta-analysis in 2012 (20).

One plausible explanation for this effect is the high prevalence of psychological disorders such as depression and anxiety among these patients. Several studies have reported significant associations between vitiligo and increased rates of depression, anxiety, and related psychosocial burdens in pediatric populations (2, 21, 22). These psychological difficulties may, in turn, impair social functioning. Extensive evidence shows that depression and anxiety adversely affect social intelligence and adaptability across various age groups by disrupting emotional processing, social cognition, and interpersonal skills (23-25). For instance, depression is linked to deficits in emotion recognition and theory of mind, while anxiety is associated with poorer social skills and increased social withdrawal, all of which compromise social adaptability and competence (26, 27). Nonetheless, some studies have yielded different results. For instance, Bilgiç et al. (2011) did not find significant psychological or social differences between children with vitiligo and healthy peers. A key factor in this discrepancy may be the developmental stage of participants. Most children in their study were in the early preadolescent phase, a period when concerns about body image and appearance are typically less prominent. The authors suggest that earlier exposure to the condition may give children more time to develop adaptive coping strategies, shifting their self-worth away from physical appearance and toward internal or achievement-based goals (28).

While psychosocial factors likely provide the main explanation for the observed social difficulties, some preliminary evidence suggests that systemic inflammatory processes in vitiligo, including immune dysregulation and elevated pro-inflammatory cytokines, may also play a speculative role. Findings from other conditions indicate that such inflammatory changes can be associated with alterations in brain functions related to social behavior (29, 30).

In conclusion, the results of this study highlight the profound social challenges faced by youth with vitiligo. Therefore, clinical management of pediatric vitiligo should adopt a holistic, biopsychosocial approach that routinely includes screening for social skills deficits and provides access to psychological interventions, such as social skills training and cognitive-behavioral therapy, aimed at bolstering social competence and resilience.

4-1. Limitations and Suggestions for Future Research

Despite its contributions, this study has several limitations that should be considered when interpreting the findings and designing future research. First, the cross-sectional nature of the study design precludes any causal inferences about the relationship between vitiligo and deficits in social competence. It remains unclear whether the condition leads to social difficulties or whether pre-existing social vulnerabilities influence the condition's progression.

Second, the reliance on self-report measures may introduce biases, such as social desirability or the influence of transient mood states. Future studies would benefit from incorporating multi-informant data (e.g., reports from parents and teachers) and behavioral observations to provide a more objective assessment of social functioning.

Third, the relatively modest sample size, although adequate for initial comparisons, may limit the generalizability of the findings and the statistical power to detect more subtle effects or conduct advanced subgroup analyses (e.g., based on disease severity or lesion location).

Fourth, the study did not account for potential confounding variables known to impact psychosocial outcomes, such as the clinical severity of vitiligo (e.g., using the VASI score), the duration of the illness, or the visibility of the lesions (e.g., on the face vs. trunk). The absence of these controls limits the precision of the findings.

Finally, the participant pool was recruited from a single clinical center in one city, which limits the cultural and geographical diversity of the sample. Consequently, the findings may not be fully generalizable to other populations with different cultural attitudes toward skin appearance and chronic illness.

Choice of Control Group: The selection of control participants from the first-degree relatives of other vitiligo patients presents a methodological trade-off. While this approach was implemented to enhance group comparability on difficult-to-measure familial and socio-environmental confounders (e.g., socioeconomic status, cultural values, access to resources), it may have introduced a different form of bias. As the reviewer rightly notes, controls from the same extended family network may share attitudes towards skin conditions, body image concerns, or even genetic predispositions to certain psychological traits. This could lead to an underestimation of the true effect size between the groups (a bias towards the null) by making the control group more similar to the case group in aspects related to the psychosocial experience of living with a visible difference. Therefore, the observed differences likely represent a conservative estimate. Future case-control studies should consider recruiting controls from the general population while meticulously measuring and statistically adjusting for key socio-demographic and environmental covariates.

Unmeasured Clinical Variables: Although we ensured that all vitiligo participants had lesions in socially sensitive areas (face/hands) and collected physician-rated global severity, the study lacked standardized quantitative clinical metrics. We did not employ the Vitiligo Area Scoring Index (VASI) for precise severity assessment, systematically map lesion distribution patterns, or use validated diagnostic tools to screen for concurrent anxiety or depressive disorders. These unmeasured factors are potential confounders that could influence social functioning independently or interact with vitiligo status. Therefore, while our findings highlight a significant association, they cannot definitively disentangle the unique contribution of the disease itself from other correlated clinical features.

Future research should address these limitations by employing longitudinal designs with larger, more diverse samples. It should also include objective clinical metrics of vitiligo and utilize mixedmethod approaches to gain a deeper, more nuanced understanding of the social challenges faced by this population.

5- CONCLUSION

This study provides clear evidence that children and adolescents with vitiligo experience significant deficits in core social competencies, namely social intelligence and social adjustment, compared to their healthy peers. These deficits permeate key domains of their lives, including family, school, and peer relationships.

The underlying mechanisms are likely multifaceted, involving a complex interplay of psychosocial factors—such as stigma, distorted self-perception, and emotional distress—and potential biological pathways related to the systemic inflammatory nature of vitiligo. This underscores the condition's impact extends far beyond the skin, affecting fundamental aspects of psychosocial development.

Therefore, moving beyond purely dermatological care is imperative. The findings strongly advocate for integrating routine psychosocial screening and accessible, targeted interventions—such as social skills training and cognitive-behavioral therapy—into the standard management protocol for pediatric vitiligo. Ultimately, fostering inclusive environments, raising public awareness to reduce stigma, and equipping these youths with robust social-cognitive tools are essential steps toward improving their long-term resilience and overall quality of life.

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