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A Sociological Explanation of Adolescent Agency in the Phenomenon of Fuel Carrying with Emphasis on Social Identity Formation: A Case Study of Upper-Secondary School Students in Minab County

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A B S T R A C T

Purpose: This study aimed to sociologically explain the lived experiences of male upper-secondary school students in Minab County and to examine how structural constraints, social identity formation, and adolescent agency interact in shaping their participation in the informal economy of fuel carrying.

Methods and Materials: This qualitative study employed thematic analysis based on Braun and Clarke's approach. Participants consisted of 15 male upper-secondary school students in Minab County who had direct experience of involvement in fuel carrying. Data were collected through in-depth, semi-structured interviews and analyzed through systematic familiarization with the data, initial coding, generation and review of themes, definition and naming of themes, and interpretive synthesis. Particular attention was paid to the interaction between structural socioeconomic conditions, peer and community networks, identity construction, risk-taking, and the cultural meanings attributed to fuel carrying within the border-region context.

Findings: The interpretive analysis indicated that adolescents' involvement in fuel carrying emerged from a dialectical relationship between structural deprivation and identity-oriented agency. Livelihood pressure created the structural conditions for participation, while socialization within fuel-carrying networks transmitted locally valued knowledge, norms, and behavioral expectations. Engagement in risky activities functioned as a means of acquiring status, demonstrating masculinity, and achieving social recognition in contexts where formal educational and occupational institutions provided limited opportunities for such recognition. Moreover, the cultural normalization of fuel carrying reduced perceived moral conflict and facilitated its reinterpretation as a legitimate or necessary livelihood strategy. Collectively, the findings suggest that fuel carrying operates not merely as an economic practice but also as a symbolic arena through which adolescents construct agency, belonging, and social identity.

Conclusion: Adolescent participation in fuel carrying should be understood not simply as individual deviance or economic misconduct, but as an adaptive response to structural exclusion, limited legitimate opportunities, and the sociocultural realities of border communities, within which risky informal work may function as a mechanism of identity formation, status attainment, and symbolic transition into adulthood.

Keywords: *Fuel Carrying; Social Identity Formation; Adolescent Agency; Border Regions; Minab.*

1. Introduction

Adolescence constitutes a critical period in the life course during which individuals confront substantial psychological, social, educational, and economic transitions while simultaneously developing a more coherent sense of personal and social identity. The movement from childhood dependence toward greater autonomy is accompanied by intensified attention to social recognition, group membership, occupational aspirations, status, and the expectations associated with adulthood. Identity development during adolescence is therefore not an exclusively intrapsychic process but is embedded in the social environments in which young people participate. Longitudinal and meta-analytic evidence concerning identity development indicates that adolescence and early adulthood are characterized by substantial changes in identity status, as young people progressively explore, negotiate, and commit themselves to particular roles, values, relationships, and social positions {Kroger, 2010 #497826}. From a sociological perspective, these developmental processes cannot be separated from the structural opportunities and constraints that define adolescents' everyday lives.

Social identity provides an especially useful conceptual framework for examining adolescent behavior in socially and economically marginalized contexts. According to social identity theory, individuals derive an important part of their self-concept from their membership in social groups and from the meanings, evaluations, and distinctions attached to those groups {Tajfel, 1986 #497833}. Group membership offers not only a category of belonging but also normative expectations regarding appropriate behavior, status, prestige, and relationships with others. Research on young people's social identity has similarly emphasized the influence of family relationships, peer networks, cultural environments, social participation, and perceived social position on the formation of identity {Saroukhani, 2012 #497814}. Among students, identity formation is also shaped by social approval, collective values, and the expectations of significant others, making schools, families, peer groups, and local communities central arenas in which adolescents learn who they are and what forms of action are socially meaningful {Fazeli Motlagh, 2022 #497818;Abdollahpour, 2022 #497817}.

The family plays a particularly important role in this process because it transmits not only emotional support and behavioral expectations but also cultural meanings, socioeconomic resources, and interpretations of legitimate adulthood. Family cultural literacy and the symbolic resources available within the household can influence how students interpret their social position and construct their identities {Esnavandi, 2022 #497811}. Yet the identity resources available to adolescents are unequally distributed. Students from economically disadvantaged backgrounds may experience a tension between their family or class-based identities and the identities expected within formal educational settings. When adolescents perceive that their social background is incompatible with dominant definitions of the successful student, educational disidentification may increase, thereby weakening their sense of belonging to school and reducing the symbolic value of academic participation {Matschke, 2023 #497827}. Such identity incongruence is particularly significant in disadvantaged communities where formal schooling may appear disconnected from immediate household needs and from locally available pathways to economic participation.

These issues become more pronounced when adolescents enter labor markets at an early age. Child and adolescent labor remains a major social challenge across many regions of the world and is closely associated with poverty, household vulnerability, limited access to education, weak social protection, and restricted opportunities for adults to secure stable livelihoods. Global evidence demonstrates that child labor is not distributed randomly but tends to be concentrated in socioeconomic environments where families face persistent material deprivation and where the opportunity costs of keeping children exclusively in education are especially high {Ortiz-Ospina, 2024 #115620}. Studies of child labor in different national settings also demonstrate the complex relationship between international norms, domestic legal frameworks, household survival strategies, and weak enforcement mechanisms {Sam, 2024 #179091}. Official assessments of the worst forms of child labor likewise show that hazardous work frequently emerges where poverty, informality, weak institutional protection, and limited educational alternatives intersect {U. S. Department of Labor, 2024 #381608}.

The consequences of early participation in hazardous labor extend beyond immediate physical risk. Experiences of child labor can affect educational continuity, social development, psychological wellbeing, and perceptions of childhood and adulthood. Research examining the later experiences of individuals exposed to child labor has drawn attention to the relationship between adverse childhood experiences associated with labor and subsequent mental

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wellbeing {Torgah, 2024 #158190}. Within the Iranian context, analyses of street child labor similarly identify the interplay between economic deprivation, family circumstances, social vulnerability, and limitations in legal and protective mechanisms {Khoshsolouk, 2024 #115618}. These observations suggest that adolescent labor should not be interpreted simply as an isolated economic decision made by an individual child. Rather, it should be examined as a socially embedded phenomenon in which household necessity, institutional conditions, cultural interpretations of work, and adolescents' emerging sense of responsibility and adulthood become intertwined.

Nevertheless, schools may potentially serve as institutional counterweights to exclusion by providing recognition, belonging, social participation, and alternative routes to identity formation. Educational inclusion is not restricted to formal access to schooling; it also involves the symbolic work through which students are recognized as legitimate members of an educational community. Research on school-based interventions has highlighted the significance of inclusion, recognition, and institutional responsiveness in supporting children whose life circumstances place them at risk of marginalization {Efthymiou, 2025 #451938}. Similarly, approaches to education grounded in social justice emphasize that educational institutions are not socially neutral spaces but can either reproduce existing inequalities or actively challenge marginalization through inclusive participation and recognition {Sleeter, 2022 #497832}. Accordingly, when adolescents perceive schools as incapable of recognizing their lived realities, economic responsibilities, or locally valued identities, other social arenas may become more influential sources of belonging and status.

This issue is particularly important in border regions, where formal and informal economies often coexist and where cross-border economic activities may become integrated into everyday livelihoods. Smuggling cannot always be understood exclusively as the behavior of isolated offenders operating outside society. Research on international smuggling demonstrates that illicit and informal trade routes are shaped by state policies, border infrastructures, regulatory disparities, territorial geography, and patterns of economic opportunity {Gallien, 2021 #497822}. The routes through which goods move are therefore socially and politically produced rather than merely determined by individual criminal intent. Anti-smuggling practices and interventions are likewise embedded in competing discourses regarding legality, security, livelihood, social harm, and state authority {Hahn, 2022 #497825}. These perspectives suggest the need to move beyond purely legalistic interpretations of border economies and to analyze the social relationships and meanings through which participation in informal cross-border activity becomes possible and, in some communities, normalized.

Fuel smuggling represents a particularly important manifestation of these dynamics in the Middle East. Differences in fuel prices, subsidy systems, border governance, market demand, and economic conditions can create incentives for the movement of fuel across national boundaries. Dadpay's analysis conceptualizes fuel smuggling in the Middle East within an interconnected multinational market, demonstrating that such activity is shaped by broader economic relationships rather than by local behavior alone {Dadpay, 2020 #497820}. In Iran, research addressing fuel smuggling has similarly emphasized the role of economic incentives, structural conditions, management deficiencies, regulatory challenges, and the complexity of combating informal fuel distribution {Akbarian, 2020 #497812;Saffari Darbarzi, 2021 #497815}. Consequently, fuel carrying in border communities must be situated within a larger political economy in which national energy policies, regional inequalities, local labor markets, and cross-border demand interact.

At the local level, however, these macrostructural forces are experienced through everyday household decisions and community practices. Research on young people's tendency toward fuel smuggling in Hormozgan Province has identified the relevance of economic and social factors, indicating that participation cannot adequately be explained through individual dispositions alone {Ahmadi Kohan-Ali, 2018 #497810}. Similarly, fuel carrying has been described as a survival strategy in border areas where limited formal employment opportunities encourage households to rely on informal economic activities {Zarei, 2017 #497813}. This interpretation is especially important because the language of “survival strategy” shifts analytical attention from individual deviance toward the structural conditions under which certain forms of work become rational, necessary, or unavoidable from the perspective of local actors.

Minab County provides a particularly relevant setting for examining these processes because fuel smuggling and related informal activities have become socially visible components of the local border economy. Previous research conducted in Minab has documented the social and cultural consequences associated with goods and fuel smuggling and

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has demonstrated that the phenomenon affects not merely economic transactions but also community relationships, norms, cultural meanings, and perceptions of legitimate work {Zahirinia, 2017 #497816}. In such an environment, adolescents are exposed to fuel carrying not as an abstract illegal activity but as a recognizable social practice performed by relatives, neighbors, peers, and other members of the local community. Repeated exposure can influence how risk, legality, work, responsibility, and success are interpreted, potentially weakening the symbolic boundary between formal employment and illicit economic activity.

The participation of adolescents in these networks can also be interpreted through the concept of socialization. Entry into fuel carrying involves more than the decision to earn money; it may require learning routes, technical skills, safety practices, informal codes, collective expectations, and strategies for interacting with both fellow participants and regulatory authorities. Such knowledge is often transmitted through kinship and peer networks. The process may therefore create a distinctive social world in which adolescents gain competencies, recognition, and membership through participation. Collective identity scholarship has shown that identities can emerge through shared experiences, networks, boundaries, narratives, and meanings that generate a sense of "we" among participants {Polletta, 2001 #497829}. Moreover, collective identity can become connected to shared interpretations of social position, perceived injustice, and relationships with external institutions or authorities {Simon, 2001 #497831}. Although fuel-carrying networks are not necessarily collective movements, these theoretical insights are relevant for understanding how repeated interaction can generate shared identities, solidarities, and behavioral norms.

The phenomenon is also closely related to adolescent agency. Adolescents involved in fuel carrying should not be represented solely as passive victims of structural deprivation, because they interpret conditions, make choices within constraints, develop competencies, negotiate family expectations, and actively construct social meanings. At the same time, describing their actions as entirely autonomous choices would disregard the socioeconomic pressures under which those choices occur. Giddens's structuration theory provides a useful conceptual basis for avoiding this false dichotomy by emphasizing the recursive relationship between structure and agency: social structures constrain and enable action, while actors reproduce or potentially modify those structures through recurrent practices {Giddens, 1984 #497823}. From this perspective, adolescent fuel carrying may be understood as a form of situated agency operating within structurally restricted opportunity fields.

Such agency may acquire particular importance in relation to masculinity, independence, and social adulthood. In communities where stable formal employment is scarce, earning income through physically demanding and dangerous activities may offer young males an alternative route toward recognition. The ability to contribute financially to the household, withstand danger, master difficult routes, and demonstrate competence can become symbolic markers of maturity. Social approval from peers and significant others may further reinforce these meanings, particularly when locally valued group norms become integrated into adolescents' developing identities {Fazeli Motlagh, 2022 #497818}. In this sense, participation in fuel carrying may simultaneously satisfy material needs and provide symbolic resources through which young people claim autonomy, responsibility, courage, and adult status.

This process may also contribute to the normalization of risk and illegality. When an informal activity is repeatedly described as "work," performed by trusted family members, accepted by peers, and economically necessary for household survival, its legal classification may become less salient than its social function. Local moral evaluation can therefore diverge from formal legal definitions. Research emphasizing the structural foundations of fuel smuggling suggests that persistent economic inequalities and deficiencies in alternative employment opportunities can contribute to the reproduction of the phenomenon despite enforcement efforts {Saffari Darbarzi, 2021 #497815}. Management-oriented analyses likewise indicate that effective responses to fuel smuggling require coordinated and multidimensional governance rather than reliance on enforcement alone {Akbarian, 2020 #497812}. These findings underscore the importance of understanding the social mechanisms through which informal fuel economies are sustained.

At the same time, the institutional environment surrounding adolescents deserves greater attention. Families, schools, local labor markets, community networks, and governmental institutions may send different or even contradictory messages regarding work, education, legality, adulthood, and responsibility. A student may formally be expected to prioritize education while simultaneously being morally expected within the household to contribute to family income. The school may define regular attendance and academic achievement as the legitimate pathway to

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future status, whereas the local economy may offer immediate recognition and earnings through fuel carrying. Such competing expectations may intensify the challenge of identity formation, especially where students already perceive a mismatch between their socioeconomic background and institutional conceptions of student success {Matschke, 2023 #497827}. Social identity thus becomes a critical analytical link between structural deprivation and behavioral participation.

Despite the growing literature on fuel smuggling, border economies, child labor, and adolescent identity, important gaps remain. Existing Iranian research has substantially clarified the economic and structural causes of fuel smuggling, its management challenges, its social consequences, and the factors associated with young people's participation {Ahmadi Kohan-Ali, 2018 #497810;Zahirinia, 2017 #497816;Akbarian, 2020 #497812}. International scholarship has similarly advanced understanding of smuggling routes, contraband markets, regulatory environments, and anti-smuggling interventions {Dadpay, 2020 #497820;Gallien, 2021 #497822;Hahn, 2022 #497825}. However, considerably less attention has been devoted to the lived experiences of school-aged adolescents who participate in fuel carrying and to the ways in which they interpret their participation as part of their emerging social identities.

A sociological analysis centered on adolescents' own narratives can therefore make an important contribution by connecting three levels of explanation that are often studied separately: structural deprivation, network-based socialization, and identity-oriented agency. Such an approach recognizes that economic necessity may initiate participation but may not fully explain its persistence or subjective meaning. Once adolescents become embedded in local networks, participation can generate skills, income, peer recognition, solidarity, autonomy, and symbolic status. These outcomes may transform an initially compelled activity into an identity-bearing social practice. Consequently, explaining adolescent fuel carrying requires attention not only to why young people enter this sphere but also to how they interpret it, how participation reshapes their relationships with family and peers, and how the experience affects their understanding of work, adulthood, legality, and social belonging.

This study therefore aimed to sociologically explain the agency of male upper-secondary school students involved in fuel carrying in Minab County by examining their lived experiences and the processes through which structural constraints, informal socialization, and social identity formation shape their participation in this phenomenon.

2. Methods and Materials

The present study adopted a qualitative approach and was conducted with the aim of exploring the lived experiences and social identity formation of male upper-secondary school students involved in the phenomenon of fuel carrying in Minab County during the 2025–2026 academic year. Data were collected through semi-structured interviews with 15 students selected using purposive sampling. To analyze the data and identify patterns of meaning, thematic analysis was conducted based on Braun and Clarke's (2006) six-phase framework, encompassing the process from familiarization with the data and initial coding to the generation, review, and definition of themes. Finally, to ensure the quality and trustworthiness of the findings, Lincoln and Guba's four criteria—credibility, dependability, confirmability, and transferability—were carefully addressed through systematic documentation, code review, and member checking.

3. Findings and Results

This section of the findings examines data obtained from in-depth, semi-structured interviews with 15 male upper-secondary school students in Minab County who had direct or indirect experience of participating in fuel-carrying activities. The purpose of this analysis was to understand adolescents' lived experiences and subjective representations of fuel carrying, how they assign meaning to this practice, the contextual factors contributing to their entry into it, and the redefinition of their social and economic identities within this context. Data analysis was conducted according to Braun and Clarke's (2006) six-phase framework, comprising familiarization with the data, generation of initial codes, searching for themes, reviewing themes, defining and naming themes, and, finally, producing the scientific report.

The participants in this section consisted of 15 male students aged 15–18 years who were enrolled in Grades 10–12 of upper-secondary education and resided in urban and rural areas of Minab County, including surrounding localities such as Tiab, Band-e Zarak, and Kerian. Most of these students came from families characterized by low educational attainment and unstable or seasonal occupations, such as daily wage labor, traditional fishing, or the household head's own involvement in fuel carrying. In terms

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of socioeconomic status, these families were predominantly situated within the lower-income strata of the local community.

The thematic analysis resulted in the identification of four main themes, 16 subthemes, and 20 key codes representing the conceptual structure of the students' narratives. Details of this classification are presented in Table 1.

Table 1

Comprehensive Thematic Analysis of the Lived Experiences of Students Engaged in Fuel Carrying: A Case Study of Minab County

No.	Initial Codes Derived from Interview Data	Subtheme	Main Theme
1	Unemployed father; family income lower than household expenses; homemaker mother	Family poverty	Livelihood compulsion
2	Contributing to household expenses; paying school-related costs; purchasing clothing and stationery	Premature economic responsibility	Livelihood compulsion
3	Lack of employment in the village; absence of alternative job opportunities in the region	Lack of occupational alternatives	Livelihood compulsion
4	Enduring difficult routes, night work, cold, and heat in exchange for daily income	Livelihood hardship and physical strain	Livelihood compulsion
5	Sense of having no choice; repeated statements such as "There is no other option"	Perceived economic constraint	Livelihood compulsion
6	Encouragement from classmates; going in groups during the first experience of fuel carrying	Peer influence	Socialization within the fuel-carrying network
7	Uncles, cousins, and older brothers involved in transporting fuel	Kinship ties	Socialization within the fuel-carrying network
8	Learning routes, informal trails, and methods of evading checkpoints	Informal acquisition of skills	Socialization within the fuel-carrying network
9	Formation of friendship-based work groups with their own specific rules and norms	Formation of collective action networks	Socialization within the fuel-carrying network
10	Sharing earnings and assisting group members injured in accidents	Solidarity and mutual support	Socialization within the fuel-carrying network
11	Repeated statements such as "I feel like I have become a man" after the first work experience	Demonstration of masculinity and maturity	Identity formation through risk-taking behavior
12	Feelings of excitement, pride, and courage while evading enforcement officers	Sensation seeking and daring	Identity formation through risk-taking behavior
13	Having an independent income and no longer being financially dependent on parents	Independence and autonomy	Identity formation through risk-taking behavior
14	Competition over the number of trips and the speed of transporting loads	Peer competition	Identity formation through risk-taking behavior
15	Modeling adult drivers and reproducing their behaviors	Enactment of adult roles	Identity formation through risk-taking behavior
16	Using terms such as "work" or "earning a living" instead of "fuel smuggling"	Linguistic and semantic reframing	Normalization of smuggling
17	Viewing successful local individuals who became wealthy through fuel carrying as role models	Local models of success	Normalization of smuggling
18	Family members wishing them safety with expressions such as "May God protect you"	Family acceptance and in-group legitimation	Normalization of smuggling
19	Indifference of school administrators and teachers toward students' absences and fatigue	Weak formal institutional supervision	Normalization of smuggling
20	Defining fuel carrying as a routine occupation within the local economy	Social and cultural legitimacy of the work	Normalization of smuggling

1. First Theme: Livelihood Compulsion

The theme of livelihood compulsion reflects structural poverty and accumulated inequalities in the border region that compel adolescents to enter the cycle of informal labor. In the students' narratives, fuel carrying is framed not as a freely chosen rational decision but as the only available means of ensuring the family's economic survival.

16-year-old student, Grade 11: "My father hasn't been able to work since he became ill. He only has a motorcycle, and he uses it to carry fuel. I've been helping him for a while. If we don't go, we can't cover the household expenses. There really isn't any other work."

17-year-old student, Grade 12: "I know it's dangerous, but what am I supposed to do? If I don't go, where will the money for my notebooks and school clothes come from? Every time I say this will be the last time, but then you're forced to go again."

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2. Second Theme: Socialization Within the Fuel-Carrying Network

This theme focuses on the process of adolescents' informal socialization within local, familial, and peer networks. Entry into this sphere requires the acquisition of technical skills, route-navigation knowledge, and behavioral codes, which are learned through close interaction with kinship and friendship networks.

15-year-old student, Grade 10: "At first, I went with one of my classmates just to watch. Then I helped out two or three times, and after that I became the one driving the motorcycle."

17-year-old student, Grade 11: "My uncle and cousins have been doing this for several years. They used to say that if you don't do it, you'll fall behind. I learned from them how to get through the routes and where there are fewer police."

3. Third Theme: Identity Formation Through Risk-Taking Behavior

In the absence of legitimate and formal channels for attaining social status, adolescents draw on the risky nature of fuel carrying to construct their identities and demonstrate maturity and masculinity. In other words, risk-taking becomes a form of symbolic identity capital within the peer group.

18-year-old student, Grade 12: "When I'm on the motorcycle and the fuel tanks are full, I feel like no one can stand in my way. It's dangerous, but that danger itself shows that you've become a man."

16-year-old student, Grade 10: "Among my friends, the one who carries more loads or manages to come back safely gets respected. It's kind of a source of pride."

4. Fourth Theme: Normalization of Smuggling

The cultural and linguistic normalization of smuggling within the local community prevents feelings of guilt, perceptions of deviance, or a sense of lawbreaking from developing among the students. Within this context, the fuel economy is perceived as an ordinary and routine component of community life.

17-year-old student, Grade 12: "We don't call it smuggling; we call it work. For example, when I say I went to work today, it means I went to carry fuel."

16-year-old student, Grade 10: "Everyone in the village does this, from young people to old people. Nobody thinks it's bad. They just tell you to take care of yourself."

4. Discussion and Conclusion

The present study sought to provide a sociological explanation of adolescent agency in the phenomenon of fuel carrying, with particular emphasis on social identity formation among male upper-secondary school students in Minab County. The thematic analysis generated four main themes: livelihood compulsion, socialization within the fuel-carrying network, identity formation through risk-taking behavior, and normalization of smuggling. Taken together, these findings indicate that adolescents' involvement in fuel carrying cannot be explained solely as an individual economic decision or as a form of deviant conduct. Rather, their participation emerges from the interaction of structural deprivation, family and peer networks, locally available economic opportunities, identity-related needs, and culturally embedded interpretations of work and legitimacy. The findings therefore suggest that fuel carrying is simultaneously an economic practice, a socialization process, and an arena for the construction of adolescent social identity.

The first major finding concerned livelihood compulsion. Participants consistently described fuel carrying as a response to household poverty, unstable parental employment, inadequate family income, absence of alternative job opportunities, and the need to meet personal and educational expenses. Their narratives showed that participation was frequently experienced as compulsory rather than voluntary. Statements emphasizing that "there is no other option" reflected a subjective perception of economic necessity and constrained choice. This finding is consistent with previous Iranian research showing that economic deprivation, unemployment, income inequalities, and limited occupational opportunities are among the most important structural factors contributing to fuel smuggling and fuel-carrying activities in border areas {Saffari Darbarzi, 2021 #497815;Ahmadi Kohan-Ali, 2018 #497810}. Similarly, Zarei described fuel carrying as a survival strategy in border regions in which formal employment opportunities are insufficient to provide stable livelihoods {Zarei, 2017 #497813}. The present findings extend these arguments by demonstrating how such structural pressures are experienced specifically by school-aged adolescents.

The livelihood-based interpretation of fuel carrying is also compatible with the broader literature on child and adolescent labor. Child labor is strongly associated with poverty, household vulnerability, insufficient social protection, and the economic necessity of children's

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contributions to family survival {Ortiz-Ospina, 2024 #115620}. Cross-national evidence also demonstrates that child labor often persists where legal restrictions coexist with local economic realities that make early employment materially necessary {Sam, 2024 #179091}. Reports on hazardous forms of child labor similarly highlight the interaction of poverty, informality, weak institutional protection, and limited alternatives to dangerous employment {U. S. Department of Labor, 2024 #381608}. From this perspective, the adolescents in the present study are not simply choosing hazardous informal work; they are responding to a restricted opportunity structure in which formal educational participation does not necessarily resolve immediate household needs.

The present findings further suggest that early economic responsibility may accelerate adolescents' transition toward adult-like social roles. Participants reported contributing to household expenses, financing their own school materials, and reducing financial dependence on parents. Such experiences may create a paradoxical condition in which adolescents remain institutionally defined as students while simultaneously performing economic functions commonly associated with adulthood. Research on the consequences of child labor has indicated that early labor experiences may alter developmental trajectories and may be associated with long-term psychological and social consequences {Torgah, 2024 #158190}. Studies of child labor in vulnerable contexts likewise suggest that economic pressures can blur normative boundaries between childhood and adulthood {Khoshsolouk, 2024 #115618}. The current findings therefore indicate that livelihood compulsion is not merely an economic background condition but also an important mechanism through which adolescents redefine their roles, responsibilities, and sense of maturity.

The second major theme was socialization within the fuel-carrying network. Participants described entering the activity through classmates, relatives, older siblings, cousins, and other familiar local actors. They also reported learning routes, methods of movement, behavioral codes, and strategies for avoiding checkpoints through direct interaction with experienced participants. This finding shows that fuel carrying is embedded in relational networks through which knowledge, expectations, and practical competencies are transmitted. The process resembles informal occupational socialization: adolescents are gradually introduced into the practices, rules, and meanings of the activity through observation, participation, and peer or family guidance.

This result is consistent with research demonstrating that smuggling networks are socially organized and shaped by relationships, local routes, institutional conditions, and established forms of coordination rather than being purely individual activities {Gallien, 2021 #497822}. Research on anti-smuggling activism has likewise emphasized that smuggling operates through networks and social discourses that influence how participants interpret the legitimacy and consequences of their actions {Hahn, 2022 #497825}. The present findings add an adolescent dimension to this literature by showing that family and peer networks may function as channels of social learning and entry into the informal fuel economy. In this context, the availability of trusted network members reduces uncertainty, provides practical knowledge, and makes participation more accessible.

The role of peers and family in this socialization process is also consistent with research on adolescent identity formation. Students' social identities are influenced by family relations, peer interactions, social approval, and group values {Abdollahpour, 2022 #497817;Fazeli Motlagh, 2022 #497818}. Family cultural resources and patterns of meaning transmission also affect how adolescents construct identities and interpret their social environments {Esnavandi, 2022 #497811}. In the present study, however, family and peer influence extended beyond values or attitudes and included direct transmission of technical skills and behavioral strategies. This suggests that identity formation and practical socialization occur simultaneously: adolescents not only learn how to engage in fuel carrying but also learn what the activity signifies within their social world.

The findings can also be interpreted through the concept of collective identity. Collective identity develops when individuals come to recognize themselves as part of a shared social category with common experiences, meanings, and expectations {Polletta, 2001 #497829}. Similarly, social psychological approaches emphasize that collective identity is shaped by shared interpretations of group position and relationships with other social actors or institutions {Simon, 2001 #497831}. Participants in the present study described friendship-based working groups, mutual assistance, shared income practices, and support for injured members. These behaviors indicate that the fuel-carrying network may provide not only instrumental support but also a sense of belonging and solidarity. Such group membership can strengthen commitment to participation by transforming an

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economically motivated activity into a socially meaningful collective practice.

The third major theme was identity formation through risk-taking behavior. Participants described fuel carrying as a means of demonstrating courage, maturity, masculinity, independence, and competence. Risk itself appeared to possess symbolic value. Successfully completing dangerous trips, evading authorities, carrying larger loads, or returning safely generated peer respect and personal pride. This suggests that risk-taking functions as a symbolic resource through which adolescents can establish status in a context where alternative routes to recognition may be limited.

This finding is strongly compatible with social identity theory, which holds that individuals derive part of their self-concept and self-evaluation from membership in socially meaningful groups {Tajfel, 1986 #497833}. When certain behaviors are valued within a group, performing them may reinforce both group identification and personal self-worth. In the context examined here, successful participation in dangerous fuel-carrying activities appears to operate as a marker of competence and belonging. The approval of peers therefore contributes to the transformation of risk into social status. This interpretation is also consistent with findings showing that group values and others' approval play an important role in identity formation among secondary school students {Fazeli Motlagh, 2022 #497818}.

The participants' narratives also reflected developmental processes associated with adolescence and emerging adulthood. Identity development during this period involves exploration, commitment, and reorganization of personal and social roles {Kroger, 2010 #497826}. Adolescents seek opportunities to establish autonomy and to demonstrate that they are capable of occupying meaningful adult positions. In communities where formal pathways to achievement are restricted, economically productive and physically demanding activities may become alternative spaces for identity achievement. The present findings therefore suggest that fuel carrying can function as a locally available identity project through which adolescents construct a sense of adulthood, self-reliance, and masculine competence.

This interpretation is further supported by research showing that incompatibility between students' socioeconomic backgrounds and dominant student identities may contribute to educational disidentification {Matschke, 2023 #497827}. If school does not provide adolescents with sufficient opportunities for recognition, belonging, or status, other social environments may become more important in identity formation. For economically disadvantaged adolescents, the immediate financial rewards and peer recognition associated with fuel carrying may be more tangible than the delayed rewards associated with educational achievement. This does not necessarily indicate rejection of education; rather, it reveals competition between different sources of identity and social status.

The relationship between structural constraints and identity-oriented agency can be understood particularly well through Giddens's theory of structuration. Individuals act within structures that both constrain and enable their behavior, while recurrent practices contribute to the reproduction of those structures {Giddens, 1984 #497823}. The adolescents in the present study were constrained by poverty, regional unemployment, family needs, and limited legitimate opportunities, yet they were not entirely passive. They actively interpreted these conditions, acquired skills, formed relationships, competed for status, and constructed identities through their participation. Their agency is therefore best understood as situated agency: meaningful action performed within a limited structural field rather than unrestricted individual choice.

The fourth major finding concerned the normalization of smuggling. Participants commonly referred to fuel carrying as "work" or "earning a living" rather than as smuggling. Families frequently accepted the activity, successful local fuel carriers served as role models, and respondents described limited criticism from schools or community members. These findings indicate that the legal definition of fuel smuggling may not correspond to its local cultural interpretation. In the everyday life of the community, repeated exposure and economic dependence appear to have transformed the practice into a routine occupational activity.

This finding corresponds with previous research on the social and cultural consequences of fuel and goods smuggling in Minab County, which showed that smuggling can become embedded in local norms and community life {Zahirinia, 2017 #497816}. Economic and structural research has likewise suggested that persistent inequalities and limited alternatives contribute to the continuation and social reproduction of fuel smuggling {Saffari Darbarzi, 2021 #497815}. At a broader level, the organization of fuel smuggling in the Middle East has been linked to price differences, subsidy systems, cross-border demand, and regional economic structures {Dadpay, 2020 #497820}. These factors help explain why local communities may interpret fuel carrying less as an isolated violation and more as an established livelihood within a wider economic system.

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The normalization identified in this study also helps explain why purely enforcement-based responses may have limited effectiveness. Management research on fuel smuggling in Iran has emphasized the need for coordinated, multidimensional strategies rather than reliance exclusively on punitive intervention {Akbarian, 2020 #497812}. When an activity is economically necessary, socially embedded, and culturally legitimized, enforcement alone may fail to address the underlying conditions that reproduce participation. Indeed, stronger enforcement without alternative livelihood opportunities may intensify risk without eliminating the economic motivations that sustain the practice.

Schools occupy an especially important position in this context. Participants' descriptions of school indifference toward absenteeism and fatigue suggest that educational institutions may not always function as effective protective or identity-building environments. Inclusive educational approaches emphasize that schools should provide recognition, belonging, and meaningful participation for students facing difficult social circumstances {Efthymiou, 2025 #451938}. Socially responsive education can also challenge exclusion by acknowledging the social conditions that shape students' experiences rather than treating educational participation as detached from broader inequalities {Sleeter, 2022 #497832}. The present findings therefore suggest that strengthening schools' capacity to recognize and respond to students involved in hazardous informal labor may be essential to reducing their dependence on alternative identity structures outside formal institutions.

Overall, the four themes demonstrate that adolescent fuel carrying in Minab County is produced through a complex interaction among economic necessity, network-based socialization, identity construction, and cultural normalization. Livelihood compulsion draws adolescents toward the activity; family and peer networks teach them how to participate; risk-taking provides opportunities for recognition and identity formation; and normalization reduces the perceived contradiction between participation and accepted community life. These processes reinforce one another and may create a self-reproducing social environment in which fuel carrying becomes simultaneously necessary, learnable, meaningful, and legitimate. The findings therefore support a sociological interpretation that moves beyond individual-level explanations and recognizes the dialectical relationship between structural exclusion and adolescent agency.

This study has several limitations that should be considered when interpreting its findings. First, the research was conducted with a relatively small purposive sample of 15 male upper-secondary school students from Minab County, and therefore the findings are context-specific and cannot be statistically generalized to all adolescents involved in fuel carrying or to other border regions. Second, because fuel carrying is a sensitive and legally problematic activity, some participants may have withheld information or modified their responses because of concerns about confidentiality, family reactions, or possible legal consequences. Third, the study relied primarily on participants' self-reported experiences and did not include systematic observations or interviews with parents, teachers, local officials, or other actors involved in the fuel economy. Fourth, only male students were included, which limits understanding of gender differences in the consequences of border economies and informal labor. Finally, the cross-sectional design captured participants' experiences at one point in time and therefore could not examine how identity, educational trajectories, or involvement in fuel carrying change across adolescence.

Future studies should investigate adolescent involvement in fuel carrying using larger and more diverse samples from different border provinces and communities to identify similarities and context-specific differences. Comparative research involving adolescents who participate in fuel carrying and those from similar socioeconomic backgrounds who do not participate could clarify the factors that distinguish different pathways of adaptation to structural deprivation. Longitudinal qualitative studies are also recommended to examine how participation influences educational continuation, employment trajectories, identity development, family relationships, and psychosocial wellbeing over time. Future research should incorporate multiple perspectives, including parents, teachers, school counselors, community leaders, policymakers, and individuals previously involved in fuel carrying. Mixed-method designs could additionally quantify relationships among poverty, school belonging, peer influence, social identity, perceived risk, and participation. Particular attention should also be given to gender, rural–urban differences, patterns of educational disengagement, and the protective factors that enable some adolescents to avoid hazardous informal employment despite experiencing similar socioeconomic pressures.

Practical interventions should address both the structural and identity-related dimensions of adolescent fuel carrying.

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Economic support programs for low-income families, expansion of safe and locally accessible employment opportunities for adults, educational subsidies, transportation assistance, and vocational pathways for adolescents may reduce the immediate financial pressures that encourage participation. Schools in high-risk border areas should establish systematic procedures for identifying repeated absenteeism, fatigue, academic decline, and signs of involvement in hazardous work, while ensuring that responses are supportive rather than punitive. School counselors and social workers should create opportunities through which adolescents can gain status, competence, responsibility, and peer recognition through safe educational, vocational, athletic, and community activities. Family-oriented programs should increase awareness of the physical, educational, and developmental consequences of hazardous fuel carrying while acknowledging the economic pressures faced by households. At the community and policy levels, sustainable reduction of adolescent involvement requires coordinated action among schools, social welfare institutions, local employment agencies, municipalities, and border-management authorities so that legitimate alternatives become both economically viable and socially meaningful.

Authors' Contributions

Authors equally contributed to this article.

Declaration

In order to correct and improve the academic writing of our paper, we have used the language model ChatGPT.

Transparency Statement

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