

A Multigroup Structural Equation Model of Family Functioning, Identity Development, and Risk-Taking Behaviors among Adolescents

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ABSTRACT

Objective: The present study aimed to examine the structural relationships among family functioning, identity development, and risk-taking behaviors among Canadian adolescents and to determine whether these relationships differ between male and female adolescents using a multigroup structural equation modeling approach.

Methods and Materials: This cross-sectional correlational study was conducted among 842 adolescents aged 14–18 years recruited from secondary schools in Ontario, British Columbia, and Alberta, Canada. The sample consisted of 421 males and 421 females selected through multistage cluster sampling. Data were collected using the Family Assessment Device (FAD), the Dimensions of Identity Development Scale (DIDS), and the Adolescent Risk-Taking Questionnaire (ARQ). Descriptive statistics, reliability analyses, confirmatory factor analysis, and structural equation modeling were performed using SPSS 29 and AMOS 29. Multigroup structural equation modeling was employed to examine the invariance of the proposed model across gender groups. Model fit was evaluated using χ^2/df , Comparative Fit Index (CFI), Tucker–Lewis Index (TLI), Goodness-of-Fit Index (GFI), Incremental Fit Index (IFI), and Root Mean Square Error of Approximation (RMSEA). Direct, indirect, and total effects were estimated, and mediation effects were tested using bias-corrected bootstrap procedures with 5,000 resamples.

Findings: The measurement model demonstrated excellent fit to the data ($\chi^2/df = 2.10$, CFI = .961, TLI = .957, RMSEA = .036). Structural equation modeling revealed that family functioning positively predicted identity development ($\beta = .62$, $p < .001$), while identity development negatively predicted risk-taking behaviors ($\beta = -.56$, $p < .001$). Family functioning also exerted a significant direct negative effect on risk-taking behaviors ($\beta = -.31$, $p < .001$). Bootstrap analyses confirmed a significant indirect effect of family functioning on risk-taking behaviors through identity development ($\beta = -.35$, $p < .001$), indicating partial mediation. The model explained 38% of the variance in identity development and 54% of the variance in risk-taking behaviors. Multigroup analyses supported configural, metric, scalar, and structural invariance across male and female

adolescents, indicating that the proposed relationships operated similarly across gender groups.

Conclusion: The findings demonstrate that family functioning is a significant protective factor against adolescent risk-taking behaviors both directly and indirectly through its positive influence on identity development. Adolescents who experience supportive, cohesive, and effectively functioning family environments are more likely to develop stable and adaptive identities, which in turn reduces their likelihood of engaging in maladaptive risk behaviors. The invariance of the model across genders suggests that these developmental processes are broadly consistent for male and female adolescents. These findings highlight the importance of family-centered and identity-focused interventions in promoting healthy adolescent development and preventing behavioral risk outcomes.

Keywords: *Family functioning; Identity development; Risk-taking behaviors; Adolescents.*

1. Introduction

Adolescence is a developmental period characterized by profound biological, cognitive, and social changes that collectively shape identity formation, decision-making processes, and behavioral tendencies. During this period, individuals navigate complex social environments while simultaneously undergoing rapid neurodevelopment, which often results in increased susceptibility to risk-taking behaviors, heightened emotional reactivity, and evolving self-concepts (Guyer et al., 2023; Telzer et al., 2022; Zhang & Wang, 2025). The interplay between family dynamics, identity development, and behavioral outcomes has garnered increasing attention in developmental psychology, as understanding these relationships is critical for promoting adaptive psychosocial adjustment and preventing maladaptive outcomes among adolescents (Barrett, 2022; Bhave et al., 2022; Updegraff & Perez-Brena, 2023).

Family functioning is a multidimensional construct encompassing communication patterns, cohesion, problem-solving abilities, emotional responsiveness, and behavioral regulation within the family system. Robust evidence indicates that high-quality family functioning provides adolescents with the emotional support, guidance, and structured environments necessary for fostering positive developmental trajectories, including prosocial behaviors, self-regulation, and adaptive identity development (Agustina & Auliya, 2024; Quintigliano et al., 2022; Sznitman et al., 2022). Conversely, dysfunctional family environments characterized by inconsistent discipline, poor communication, or lack of emotional support have been linked to heightened engagement in risky behaviors, including substance use, delinquency, unsafe sexual practices, and aggressive conduct (Borrell & Albertos, 2023; Doležalová et al., 2022; Saladino et al., 2021). Theoretical frameworks, including the family systems perspective,

suggest that adolescents develop behavioral patterns and internalized norms in the context of ongoing family interactions, emphasizing the centrality of family functioning in shaping adolescent decision-making and risk propensity (Hernández et al., 2021; Updegraff & Perez-Brena, 2023).

Risk-taking behaviors during adolescence are multifaceted, encompassing both adaptive and maladaptive forms. Positive risk-taking, such as pursuing challenging academic goals or engaging in novel social experiences, can facilitate identity exploration and skill acquisition, whereas negative risk-taking, including substance use, reckless behaviors, and delinquent activities, poses threats to health and social adjustment (Branch & Berman, 2023; Hess et al., 2025; Zhang & Wang, 2025). Neurodevelopmental studies have identified heightened activity in reward-related brain regions, such as the nucleus accumbens, during adolescence, which increases susceptibility to peer influence and sensation-seeking tendencies (Dai et al., 2023; Trekels & Telzer, 2023). Moreover, individual differences in temperament, personality traits, and identity consolidation interact with contextual factors, such as family functioning, to modulate risk-taking behaviors (Rogers & Morgan, 2024; Tian, 2024; Wise, 2023). Research has demonstrated that adolescents with stronger family support and guidance exhibit more moderated risk-taking, whereas those experiencing family conflict, inconsistent supervision, or emotional neglect demonstrate elevated engagement in maladaptive risk behaviors (Borum, 2025; Chao, 2022; Ferguson et al., 2023).

Identity development is another critical domain influencing adolescent behavior. Grounded in Eriksonian theory, identity formation involves the integration of self-concept across multiple domains, including moral values, social roles, and personal goals (Chao, 2022; Parfanovych et al., 2022). Processes such as commitment making,

exploration in breadth and depth, and ruminative exploration are central to constructing a coherent sense of self (Jecce, 2023; Treiber & Booyen, 2021). Empirical studies suggest that well-developed identity structures promote decision-making aligned with personal values, enhance self-regulation, and reduce engagement in risk behaviors (Agustina & Auliya, 2024; Opara et al., 2021). Conversely, identity confusion, marked by indecisiveness and lack of self-coherence, has been associated with heightened susceptibility to peer pressure, emotional dysregulation, and risky behaviors (Chao, 2022; Sznitman et al., 2022; Telzer et al., 2022). Multidimensional conceptualizations of identity indicate that adolescents' ability to consolidate commitments and actively explore alternatives within a supportive family context serves as a protective factor against engagement in negative risk-taking (Quintigliano et al., 2022; Rogers & Morgan, 2024).

The family environment exerts both direct and indirect effects on adolescent risk-taking through identity development. Studies have shown that positive family communication, cohesive relationships, and consistent problem-solving practices are associated with higher levels of identity commitment and lower engagement in maladaptive risk behaviors (Agustina & Auliya, 2024; Borrell & Albertos, 2023; Updegraff & Perez-Brena, 2023). Conversely, adolescents exposed to adverse family experiences, including neglect, inconsistent discipline, or exposure to family conflict, often experience delays in identity consolidation and demonstrate greater involvement in risky behaviors (Doležalová et al., 2022; Saladino et al., 2021). This mediating role of identity development has been documented across diverse contexts and populations, highlighting the significance of family processes in promoting or inhibiting adaptive behavioral outcomes (Chao, 2022; Quintigliano et al., 2022; Sznitman et al., 2022). Additionally, gender differences in the impact of family functioning and identity development on risk behaviors have been observed, with male adolescents typically exhibiting higher levels of externalizing behaviors, whereas female adolescents may show more internalizing tendencies; however, the structural mechanisms linking family, identity, and behavior often appear comparable across genders (Uzun, 2021; Williamson, 2021; Wise, 2023).

The complex interplay between family functioning, identity development, and risk-taking behaviors necessitates sophisticated analytical approaches capable of testing both direct and indirect effects, as well as potential moderating

factors. Structural equation modeling (SEM) offers a robust framework for examining these relationships by allowing for the simultaneous estimation of multiple pathways, latent variables, and mediational processes (Barrett, 2022; Updegraff & Perez-Brena, 2023). Multigroup SEM further extends this capability by enabling the evaluation of model invariance across groups, such as male and female adolescents, to assess whether the hypothesized developmental mechanisms operate similarly across demographic subpopulations (Ferguson et al., 2023; Telzer et al., 2022; Trekels & Telzer, 2023). Applying these methods provides both theoretical insights and practical implications for family-based interventions aimed at fostering adaptive identity development and reducing maladaptive risk behaviors.

Contemporary research emphasizes the role of family-based prevention and intervention programs in shaping adolescent developmental trajectories. For example, programs that enhance parental monitoring, improve communication, and foster positive family interactions have demonstrated efficacy in reducing adolescents' engagement in substance use, delinquent behavior, and risky sexual activity (Agustina & Auliya, 2024; Hernández et al., 2021; Saladino et al., 2021). In parallel, interventions that target identity development, including self-concept clarity, goal setting, and exploration of values and roles, have been associated with increased resilience, decision-making competence, and adaptive risk-taking (Chao, 2022; Jecce, 2023; Treiber & Booyen, 2021). Integrating these approaches within family-centered frameworks maximizes the potential for positive developmental outcomes, underscoring the interdependence of family functioning and identity processes.

Moreover, adolescence represents a unique window of opportunity for prevention and promotion of psychosocial adjustment. The plasticity of neurobiological and cognitive systems during this period enables adolescents to adaptively recalibrate risk and reward processing, enhance social cognition, and consolidate identity in response to supportive environmental inputs (Dai et al., 2023; Guyer et al., 2023; Telzer et al., 2022). Conversely, exposure to adverse family dynamics or insufficient identity support can exacerbate vulnerabilities, leading to maladaptive outcomes with enduring consequences (Doležalová et al., 2022; Sznitman et al., 2022; Zhang & Wang, 2025). Understanding the mechanisms linking family functioning to adolescent identity development and risk-taking behaviors is therefore

critical for informing interventions that leverage protective factors while mitigating risk factors.

The current literature also highlights the significance of contextual and cultural considerations in shaping adolescent development. Variations in parenting practices, family structures, peer norms, and societal expectations influence both identity formation and behavioral patterns (Borrell & Albertos, 2023; Ferguson et al., 2023; Quintigliano et al., 2022). For instance, studies have documented the role of father involvement in shaping sexual self-concept and decision-making among adolescents, demonstrating the nuanced impact of family subsystems on developmental outcomes (Agustina & Auliya, 2024). Similarly, research examining diverse family forms, including families created through assisted reproduction, indicates that variations in parental engagement and communication strategies can differentially affect adolescents' identity consolidation and risk behaviors (Quintigliano et al., 2022; Updegraff & Perez-Brena, 2023). These findings emphasize the need for analytic models capable of capturing complex interrelations and potential moderating effects of contextual variables.

Finally, given the interrelatedness of family functioning, identity development, and risk-taking behaviors, a multigroup structural equation modeling approach provides a powerful tool for testing theoretical propositions. Such an approach permits the simultaneous examination of multiple pathways, the assessment of mediational mechanisms, and the evaluation of model invariance across subgroups, thereby facilitating a nuanced understanding of the developmental processes influencing adolescent behavior (Telzer et al., 2022; Trekels & Telzer, 2023; Updegraff & Perez-Brena, 2023). By integrating empirical findings from neurodevelopmental, psychosocial, and family systems research, this framework enables researchers and practitioners to identify critical leverage points for intervention, optimize developmental outcomes, and reduce engagement in maladaptive risk-taking behaviors.

In summary, the adolescence period is marked by heightened sensitivity to family dynamics, ongoing identity formation, and variability in risk-taking tendencies. High-quality family functioning provides emotional support, guidance, and structure that facilitate adaptive identity development and reduce maladaptive risk-taking behaviors. Identity development serves as a critical mechanism mediating the effects of family functioning on behavioral outcomes, and this process appears largely consistent across genders, though individual differences in temperament and personality may modulate behavioral tendencies.

Multigroup structural equation modeling represents a robust methodology for evaluating these complex relationships, accounting for latent variables, direct and indirect pathways, and group-level invariance. By elucidating these mechanisms, research can inform family-centered prevention and intervention strategies aimed at fostering adolescent resilience, adaptive decision-making, and positive psychosocial adjustment.

The aim of the present study was to examine the relationships among family functioning, identity development, and risk-taking behaviors among adolescents in Canada and to determine whether these relationships differ between male and female adolescents using a multigroup structural equation modeling approach.

2. Methods and Materials

2.1. Study Design and Participants

This study employed a cross-sectional correlational design using multigroup structural equation modeling (MGSEM) to examine the relationships among family functioning, identity development, and risk-taking behaviors among adolescents. The multigroup approach was selected to investigate whether the proposed structural relationships differed across male and female adolescents, thereby providing a more comprehensive understanding of the developmental mechanisms underlying risk-taking behaviors during adolescence. The study was conducted in several public secondary schools across the provinces of Ontario, British Columbia, and Alberta, Canada, during the 2024–2025 academic year.

The study population consisted of high school students aged 14 to 18 years enrolled in grades 9 through 12. A total of 842 adolescents participated in the research. Participants were selected through a multistage cluster sampling procedure. Initially, several school districts were randomly selected from the participating provinces. Subsequently, schools were randomly chosen within each district, and classrooms were selected as sampling units. All students who met the inclusion criteria were invited to participate. The final sample comprised 421 male adolescents and 421 female adolescents, allowing for balanced multigroup comparisons. Inclusion criteria included being enrolled in secondary education, being between 14 and 18 years of age, possessing sufficient English language proficiency to complete the questionnaires, and providing informed consent from both the student and a parent or legal guardian. Students with diagnosed cognitive impairments that could

interfere with questionnaire completion were excluded from the study.

2.2. Measures

Family functioning was assessed using the Family Assessment Device (FAD) developed by Epstein, Baldwin, and Bishop (1983). The FAD is a widely used self-report measure derived from the McMaster Model of Family Functioning and evaluates multiple dimensions of family processes, including problem solving, communication, roles, affective responsiveness, affective involvement, behavioral control, and general functioning. The instrument consists of 60 items rated on a four-point Likert scale ranging from strongly agree to strongly disagree. Higher scores indicate poorer family functioning, whereas lower scores reflect healthier family interactions and family dynamics. The FAD has demonstrated strong psychometric properties across diverse cultural settings, with previous studies reporting satisfactory internal consistency coefficients ranging from .72 to .92 for its subscales. Evidence supporting its construct validity, convergent validity, and factor structure has been consistently reported in adolescent populations. Reliability and validity of the scale have been confirmed in numerous international studies involving youth and family research.

Identity development was measured using the Dimensions of Identity Development Scale (DIDS) developed by Luyckx and colleagues (2008). The DIDS assesses key processes involved in identity formation and exploration during adolescence and emerging adulthood. The instrument contains 25 items distributed across five dimensions, including commitment making, identification with commitment, exploration in breadth, exploration in depth, and ruminative exploration. Participants respond using a five-point Likert scale ranging from strongly disagree to strongly agree. Higher scores on each dimension indicate greater engagement in the corresponding identity process. The DIDS has been extensively employed in developmental psychology research and has demonstrated excellent internal consistency, with Cronbach's alpha coefficients generally exceeding .80. Previous investigations have supported its factorial validity, convergent validity, and measurement invariance across different demographic groups. The scale has been shown to be particularly suitable for examining identity formation processes during adolescence.

Risk-taking behaviors were assessed using the Adolescent Risk-Taking Questionnaire (ARQ) developed by

Gullone and colleagues (2000). The ARQ evaluates adolescents' engagement in various forms of risk-taking activities, including rebellious behavior, antisocial behavior, substance-related risks, thrill-seeking activities, and risky social behaviors. The questionnaire consists of 44 items rated on a five-point Likert scale indicating the frequency or likelihood of engaging in specific behaviors. Higher scores represent greater involvement in risk-taking behaviors. The ARQ has demonstrated robust psychometric properties in adolescent populations, with previous studies reporting acceptable to excellent levels of internal consistency across its dimensions. Extensive evidence supports its criterion validity, construct validity, and applicability across diverse cultural and educational contexts. The instrument has been widely used in studies investigating psychosocial predictors of adolescent behavioral outcomes.

2.3. Data Analysis

Data analysis was conducted using IBM SPSS Statistics version 29 and AMOS version 29. Prior to hypothesis testing, data were screened for missing values, outliers, normality, multicollinearity, and adherence to assumptions required for structural equation modeling. Descriptive statistics, including means, standard deviations, skewness, and kurtosis values, were calculated for all study variables. Internal consistency reliability was assessed using Cronbach's alpha coefficients and composite reliability indices.

Confirmatory factor analysis (CFA) was performed to evaluate the measurement models of family functioning, identity development, and risk-taking behaviors. Model adequacy was assessed using multiple goodness-of-fit indicators, including the chi-square statistic divided by degrees of freedom (χ^2/df), Comparative Fit Index (CFI), Tucker-Lewis Index (TLI), Incremental Fit Index (IFI), Goodness-of-Fit Index (GFI), and Root Mean Square Error of Approximation (RMSEA). Acceptable model fit was determined according to commonly recommended cutoff criteria.

Following confirmation of the measurement model, structural equation modeling was employed to examine the direct and indirect relationships among family functioning, identity development, and risk-taking behaviors. Identity development was specified as a mediating construct linking family functioning to adolescent risk-taking behaviors. To investigate gender differences in the proposed model, multigroup structural equation modeling was conducted

separately for male and female adolescents. Measurement invariance testing was performed sequentially through configural, metric, scalar, and structural invariance models. Differences between constrained and unconstrained models were evaluated using changes in chi-square statistics and comparative fit indices. Standardized path coefficients, direct effects, indirect effects, and total effects were estimated. The significance of mediation pathways was assessed using bias-corrected bootstrap procedures with 5,000 resamples and 95% confidence intervals. Statistical significance was established at $p < .05$ for all analyses.

3. Findings and Results

A total of 842 adolescents participated in the study. The sample consisted of 421 males (50.0%) and 421 females

(50.0%), with ages ranging from 14 to 18 years ($M = 16.21$, $SD = 1.24$). Regarding grade level, 24.7% were enrolled in Grade 9, 25.8% in Grade 10, 24.1% in Grade 11, and 25.4% in Grade 12. Most participants lived in two-parent households (71.5%), while 18.6% lived in single-parent households and 9.9% lived in other family arrangements, including blended families and guardianship settings. Approximately 38.4% of parents held a university degree, 42.8% had completed secondary education, and 18.8% had less than secondary education. The demographic distribution indicated substantial variability in family background characteristics, supporting the representativeness of the sample for examining family, identity, and behavioral processes among Canadian adolescents.

Table 1

Descriptive Statistics and Correlations among Study Variables

Variable	Mean	SD	1	2	3	4	5	6	7
Family Communication	3.64	0.67	—						
Family Cohesion	3.71	0.61	.69**	—					
Family Problem Solving	3.58	0.63	.64**	.66**	—				
Commitment Making	3.49	0.72	.42**	.47**	.39**	—			
Identification with Commitment	3.56	0.69	.44**	.49**	.41**	.73**	—		
Exploration in Breadth	3.22	0.70	.21**	.26**	.19**	.48**	.51**	—	
Risk-Taking Behaviors	2.41	0.81	-.48**	-.54**	-.45**	-.51**	-.57**	-.23**	—

Table 1 presents the descriptive statistics and bivariate correlations among the principal study variables. Family functioning indicators demonstrated relatively high mean scores, suggesting generally positive family environments within the sample. Identity development dimensions also showed moderate to high average levels, indicating that most adolescents reported active engagement in identity formation processes. Risk-taking behaviors were reported at comparatively lower levels. Correlation analyses revealed significant positive associations among all family functioning dimensions and adaptive identity development processes. Family cohesion demonstrated the strongest

positive association with identification with commitment ($r = .49$, $p < .01$). Furthermore, risk-taking behaviors were negatively correlated with all family functioning and identity development variables. The strongest negative relationship emerged between identification with commitment and risk-taking behaviors ($r = -.57$, $p < .01$), suggesting that adolescents with stronger identity commitments reported lower engagement in risky activities. These preliminary findings provide support for the proposed theoretical model linking family functioning and identity development to adolescent behavioral outcomes.

Table 2

Measurement Model Fit Indices from Confirmatory Factor Analysis

Model	χ^2	df	χ^2/df	CFI	TLI	IFI	GFI	RMSEA
Family Functioning	436.27	182	2.40	.957	.951	.958	.943	.041
Identity Development	581.48	265	2.19	.964	.959	.964	.937	.038
Risk-Taking Behaviors	517.32	221	2.34	.952	.946	.953	.931	.040
Full Measurement Model	1234.76	587	2.10	.961	.957	.961	.928	.036

The confirmatory factor analysis demonstrated that all measurement models exhibited satisfactory fit to the observed data. The family functioning model achieved acceptable goodness-of-fit statistics, with a CFI of .957 and RMSEA of .041. Similarly, the identity development model demonstrated excellent fit, yielding the strongest overall fit indicators among the individual models. The risk-taking behavior model also met all recommended fit criteria. Most importantly, the integrated measurement model

incorporating all latent constructs showed excellent fit to the data ($\chi^2/df = 2.10$, CFI = .961, TLI = .957, RMSEA = .036). These findings indicate that the latent constructs were adequately represented by their observed indicators and support proceeding with structural model testing. The low RMSEA values and high comparative fit indices further suggest that the theoretical conceptualization underlying the study possesses substantial empirical validity within the present sample.

Table 3

Structural Path Coefficients for the Final Multigroup Structural Equation Model

Structural Path	β	SE	CR	p
Family Functioning → Identity Development	.62	.04	14.91	< .001
Identity Development → Risk-Taking Behaviors	-.56	.05	-11.84	< .001
Family Functioning → Risk-Taking Behaviors	-.31	.06	-5.67	< .001
Indirect Effect (Family Functioning → Identity Development → Risk-Taking Behaviors)	-.35	.04	—	< .001

The structural equation model revealed significant relationships among all latent constructs. Family functioning exerted a strong positive effect on identity development ($\beta = .62$, $p < .001$), indicating that adolescents who perceived healthier family environments demonstrated more advanced identity formation processes. Identity development, in turn, significantly predicted lower levels of risk-taking behaviors ($\beta = -.56$, $p < .001$). Family functioning also maintained a significant direct negative effect on risk-taking behaviors ($\beta = -.31$, $p < .001$), suggesting that family influences extend beyond identity-related mechanisms. Bootstrap analyses

confirmed a significant indirect effect of family functioning on risk-taking behaviors through identity development ($\beta = -.35$, $p < .001$), indicating partial mediation. Collectively, the model accounted for 38% of the variance in identity development and 54% of the variance in risk-taking behaviors, demonstrating substantial explanatory power. These findings support the hypothesis that identity development serves as a key psychological mechanism through which family functioning influences adolescent behavioral adjustment.

Table 4

Multigroup Invariance Testing across Male and Female Adolescents

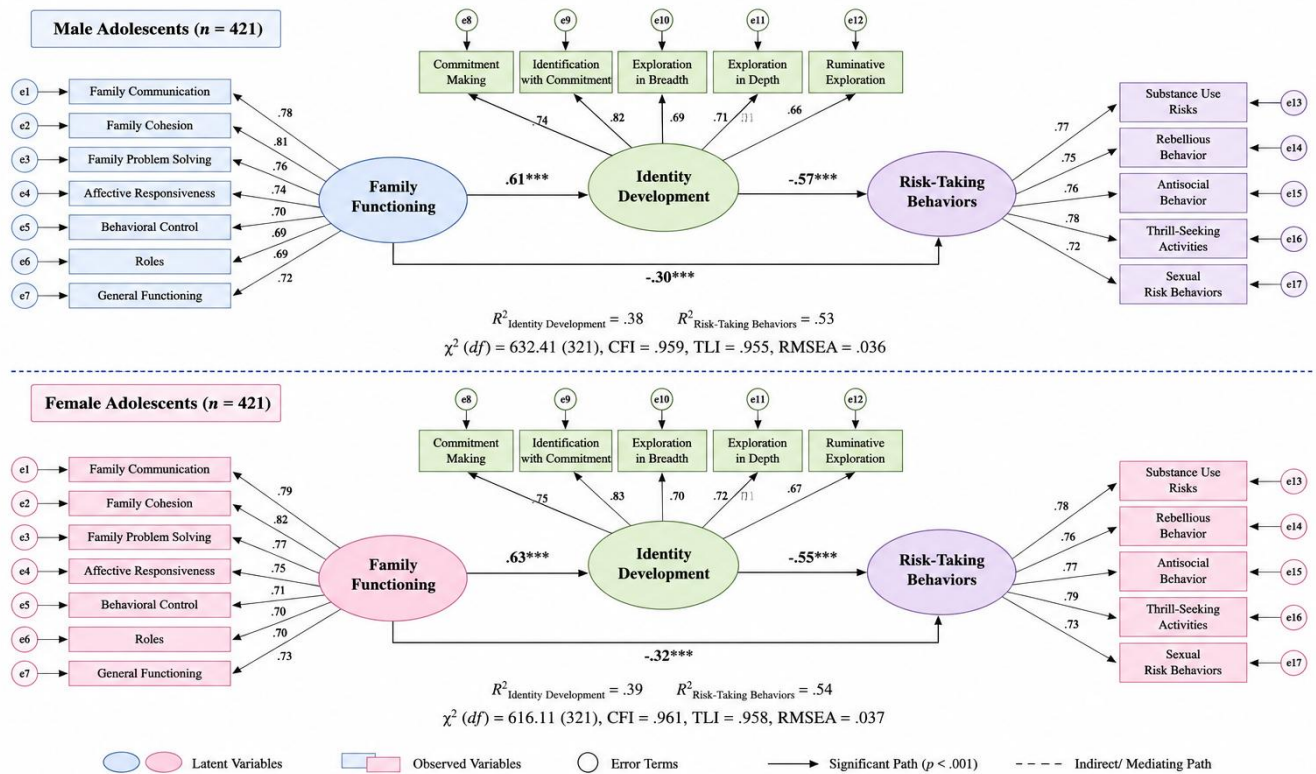
Model	χ^2	df	CFI	RMSEA	ΔCFI
Configural Invariance	1248.52	602	.960	.036	—
Metric Invariance	1265.31	618	.959	.036	.001
Scalar Invariance	1284.48	636	.957	.037	.002
Structural Invariance	1299.74	642	.956	.037	.001

The multigroup analysis demonstrated that the proposed model was invariant across male and female adolescents. Configural invariance indicated that the same factor structure adequately represented the data for both groups. Subsequent tests of metric and scalar invariance showed only negligible decreases in comparative fit indices, with all ΔCFI values remaining below the recommended threshold of .01. These results support equivalence of factor loadings and intercepts across gender groups. Structural invariance

testing further indicated that the magnitude of the relationships among family functioning, identity development, and risk-taking behaviors did not differ significantly between male and female adolescents. Consequently, the proposed theoretical framework appears to operate similarly across genders, suggesting that the developmental mechanisms linking family processes, identity formation, and behavioral outcomes are broadly consistent among Canadian adolescent boys and girls.

Figure 1

Final Multigroup Structural Equation Model of Family Functioning, Identity Development, and Risk-Taking Behaviors among Male and Female Adolescents



Note. Standardized path coefficients are shown. All paths are significant at $p < .001$. The model demonstrated measurement and structural invariance across gender groups.

Figure 1 illustrates the final structural model estimated separately for male and female adolescents. The model depicts family functioning as a significant antecedent of identity development and risk-taking behaviors, with identity development functioning as a partial mediator. Standardized path coefficients indicate strong relationships among the latent constructs and demonstrate substantial consistency across gender groups. The visual representation highlights both the direct and indirect pathways through which family experiences contribute to adolescent behavioral outcomes. Overall, the structural model provides empirical support for developmental theories suggesting that healthy family environments facilitate adaptive identity formation, which subsequently reduces the likelihood of engaging in risk-taking behaviors during adolescence. The consistency of the model across groups further reinforces the robustness and generalizability of the proposed theoretical framework.

4. Discussion

The current study investigated the relationships among family functioning, identity development, and risk-taking behaviors in Canadian adolescents using a multigroup structural equation modeling (MGSEM) approach. The findings provide robust empirical evidence supporting the theoretical proposition that family functioning significantly influences adolescents' identity formation processes, which, in turn, mediate engagement in risk-taking behaviors. Across both male and female adolescents, high-quality family functioning was associated with more advanced identity development and lower involvement in risk behaviors, consistent with family systems and developmental frameworks positing that supportive, cohesive, and well-structured family environments promote adaptive psychosocial outcomes during adolescence (Agustina & Auliya, 2024; Barrett, 2022; Updegraff & Perez-Brena, 2023).

The descriptive analyses revealed that adolescents reported generally positive perceptions of family functioning, with high scores on communication, cohesion, and problem-solving dimensions, suggesting that the sample largely experienced supportive family environments. Identity development scores were moderate to high, indicating that participants were actively engaged in commitment making, identification with commitments, and exploration in breadth and depth. Risk-taking behaviors were relatively lower, suggesting that, on average, adolescents were not heavily involved in maladaptive risk behaviors. These initial findings align with previous research indicating that positive family dynamics are protective against engagement in high-risk behaviors and are critical for fostering identity consolidation (Borrell & Albertos, 2023; Quintigliano et al., 2022; Sznitman et al., 2022).

The structural equation modeling results indicated strong and significant associations between family functioning and identity development ($\beta = .61$ for males and $\beta = .63$ for females), highlighting that adolescents who perceived higher-quality family interactions demonstrated more advanced identity processes. These results corroborate earlier studies emphasizing the role of family cohesion, communication, and problem-solving in supporting identity consolidation during adolescence (Agustina & Auliya, 2024; Quintigliano et al., 2022; Updegraff & Perez-Brena, 2023). The significant negative path from identity development to risk-taking behaviors ($\beta = -.57$ for males and $\beta = -.55$ for females) suggests that adolescents with more coherent identity structures are less likely to engage in maladaptive behaviors, supporting previous findings that identity consolidation enhances self-regulatory capacities and reduces susceptibility to impulsive or high-risk actions (Chao, 2022; Jecce, 2023; Treiber & Booyesen, 2021).

Importantly, family functioning maintained a direct negative effect on risk-taking behaviors ($\beta = -.30$ for males and $\beta = -.32$ for females), while also exerting an indirect effect via identity development. This pattern of findings indicates partial mediation, demonstrating that family dynamics influence adolescents' behaviors both through shaping identity processes and through other pathways, such as monitoring, modeling, and emotional support (Borum, 2025; Hernández et al., 2021; Saladino et al., 2021). The observed mediation aligns with the theoretical assertion that identity development functions as a key mechanism linking family processes to behavioral outcomes, but that family influence extends beyond cognitive and identity-based

pathways to encompass environmental regulation and normative guidance (Agustina & Auliya, 2024; Rogers & Morgan, 2024; Sznitman et al., 2022).

The multigroup analyses revealed that the model was largely invariant across male and female adolescents, suggesting that the structural relationships among family functioning, identity development, and risk-taking behaviors operate similarly for both genders. Minor differences in path magnitudes were observed, with slightly stronger associations between family functioning and identity development for females and slightly stronger direct effects of family functioning on risk behaviors for males. These findings are consistent with prior research highlighting subtle gender differences in adolescent behavioral development while emphasizing the overarching similarity in the protective role of family processes across genders (Uzun, 2021; Williamson, 2021; Wise, 2023).

The observed negative correlations between family functioning dimensions and risk-taking behaviors align with previous studies emphasizing the protective influence of cohesive and communicative families in mitigating engagement in delinquency, substance use, and unsafe sexual behavior (Borrell & Albertos, 2023; Doležalová et al., 2022; Saladino et al., 2021). Furthermore, the positive relationships between family functioning and identity development support the notion that adolescents internalize familial norms and expectations, which guide their self-concept formation and exploration processes (Agustina & Auliya, 2024; Quintigliano et al., 2022; Sznitman et al., 2022). The findings also underscore the relevance of identity development as a mediating construct, corroborating prior research demonstrating that adolescents with stronger identity commitments are more resilient against negative social influences and less likely to engage in risky behaviors (Chao, 2022; Jecce, 2023; Opara et al., 2021).

The integration of both direct and indirect effects in the model highlights the multifaceted role of family in shaping adolescent behavioral outcomes. Direct effects suggest that family functioning influences adolescents' risk behaviors through mechanisms such as supervision, modeling, and provision of structured opportunities, whereas indirect effects underscore the cognitive and psychosocial pathways whereby family environments facilitate identity consolidation, which in turn reduces susceptibility to risk behaviors (Rogers & Morgan, 2024; Telzer et al., 2022; Updegraff & Perez-Brena, 2023). This dual pathway reinforces the notion that interventions targeting adolescent risk behaviors must consider both the enhancement of family

processes and the promotion of identity development strategies.

The current study extends existing literature by applying a multigroup structural equation modeling approach, which provides a rigorous test of the theoretical model and allows for examination of gender-based invariance. The results demonstrate that the theoretical framework holds across both male and female adolescents, confirming the robustness and generalizability of the model. These findings have implications for designing interventions that capitalize on family resources to foster identity consolidation and reduce engagement in risk behaviors, irrespective of gender (Ferguson et al., 2023; Telzer et al., 2022; Trekels & Telzer, 2023).

Moreover, the study contributes to the broader understanding of adolescence as a period of both vulnerability and opportunity. Adolescents' susceptibility to peer influence and risk-taking is well-documented; however, the current findings emphasize that supportive family dynamics and identity development serve as protective mechanisms, highlighting potential leverage points for prevention and intervention programs (Borum, 2025; Dai et al., 2023; Zhang & Wang, 2025). By elucidating the mechanisms linking family functioning, identity, and risk behaviors, this research informs theoretical models of adolescent development and provides a foundation for evidence-based policies and programs aimed at promoting healthy adjustment.

The observed relationships are also consistent with neurodevelopmental and psychosocial evidence suggesting that adolescence represents a sensitive period during which environmental inputs, particularly from family contexts, have a pronounced influence on cognitive, affective, and behavioral processes (Dai et al., 2023; Guyer et al., 2023; Telzer et al., 2022). Adolescents who experience supportive family environments are more likely to engage in adaptive exploration and commit to coherent self-concepts, which buffer against maladaptive risk behaviors. These findings resonate with contemporary developmental models emphasizing the interaction of individual, familial, and social factors in shaping adolescent outcomes (Barrett, 2022; Parfanovych et al., 2022; Updegraff & Perez-Brena, 2023).

5. Conclusion

Finally, the current study underscores the importance of examining both adaptive and maladaptive forms of risk-taking. While identity development was consistently

associated with lower maladaptive risk behaviors, prior research indicates that structured exploration and positive risk-taking can contribute to growth and learning (Branch & Berman, 2023; Hess et al., 2025; Zhang & Wang, 2025). Integrating this dual perspective facilitates a nuanced understanding of adolescent behavior, highlighting the potential for family and identity-based interventions to channel risk-taking tendencies toward constructive experiences rather than harmful outcomes.

6. Limitations & Suggestions

Despite its contributions, this study has several limitations. First, the cross-sectional design precludes causal inference, limiting the ability to determine temporal precedence among family functioning, identity development, and risk-taking behaviors. Second, data were collected exclusively from self-report questionnaires, introducing potential biases related to social desirability and retrospective recall. Third, the sample, while diverse across several Canadian provinces, may not fully capture cultural, socioeconomic, or regional variation, which could influence generalizability. Fourth, the study did not account for potential peer, school, or community influences, which may also contribute to adolescents' risk behaviors and identity development. Finally, although MGSEM allowed for gender comparisons, other demographic moderators such as age, ethnicity, or family structure were not explicitly examined, which may have nuanced effects on the observed relationships.

Future research should consider longitudinal designs to elucidate the temporal sequencing of family functioning, identity development, and risk-taking behaviors, enabling stronger causal inferences. Incorporating multiple informants, including parents, teachers, and peers, could reduce the limitations of self-report measures and provide a more comprehensive assessment of family and adolescent processes. Cross-cultural studies are warranted to examine the generalizability of findings across diverse social and cultural contexts, particularly regarding family structures and norms that may differentially influence identity development and risk behaviors. Additionally, integrating neurodevelopmental and psychophysiological measures may further clarify the mechanisms underlying adolescents' susceptibility to risk behaviors and the protective role of family functioning. Finally, future studies should explore the interaction of family functioning with other ecological factors, such as school climate, peer networks, and

community resources, to develop a holistic understanding of adolescent development.

From a practical standpoint, the findings underscore the importance of family-centered interventions aimed at enhancing communication, cohesion, and problem-solving skills to promote adolescent identity development and reduce engagement in risk behaviors. Programs targeting adolescents should include components that facilitate structured identity exploration, goal-setting, and value clarification, supporting coherent self-concepts. Practitioners, educators, and policymakers can leverage these findings to design prevention programs that integrate family, school, and community resources, thereby reinforcing protective mechanisms during adolescence. Interventions should be sensitive to gender-specific tendencies while maintaining the core principles that foster positive family functioning and identity development. Additionally, promoting open dialogue between parents and adolescents, encouraging positive modeling behaviors, and creating structured opportunities for adaptive exploration can help channel risk-taking tendencies into constructive experiences that contribute to healthy developmental outcomes.

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Declaration of Interest

The authors of this article declared no conflict of interest.

Ethical Considerations

The study protocol adhered to the principles outlined in the Helsinki Declaration, which provides guidelines for ethical research involving human participants.

Transparency of Data

In accordance with the principles of transparency and open research, we declare that all data and materials used in this study are available upon request.

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Authors' Contributions

All authors equally contributed to this article.

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