



YOUTH UNEMPLOYMENT, SKILLS MISMATCH AND POST-WAR LIVELIHOOD TRANSITIONS IN SIERRA LEONE: A CASE STUDY OF WATERLOO

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Abstract:

Despite the end of the civil war in Sierra Leone 20 years ago, young people in peri-urban areas still suffer from high rates of labour underutilization, but there is little quantitative evidence that can explain how skills, skills fit and post-war structural conditions interact to influence young people's labour-market outcomes and livelihood adjustments. This study builds and tests a structural model that integrates Human Capital Theory, Skills Mismatch Theory and the Sustainable Livelihoods Framework, in which post-war structural constraints (PWC) influence skills mismatch (SM) and employability skills (ES), which in turn affect youth unemployment and underemployment (YU), and all four constructs are related to livelihood transitions (LT). The cross-sectional survey consisted of 250 young people (18–35 years) in Waterloo and was analysed using partial least squares structural equation modelling (PLS-SEM; 5,000 bootstrap subsamples). The reflective measurement model met all reliability and validity criteria (CR = 0.876–0.906; AVE = 0.586–0.660; all HTMT < 0.85). Skills mismatch ($\beta = 0.411$) and employability skills ($\beta = -0.410$) were the strongest and near-equal competing predictors of YU, with PWC having a direct effect ($\beta = 0.205$) and an indirect effect through SM and ES, which accounted for 49.5% of the variance in YU. Livelihood transitions were directly linked to SM ($\beta = 0.312$), ES ($\beta = 0.330$) and PWC ($\beta = 0.206$) but not to YU ($\beta = 0.058$, $p = .454$), suggesting that transitions are not directly tied to being jobless. The results suggest that policy should focus on training to meet local labour demand, and on the reconstruction of skills infrastructure and livelihood portfolios, not job placement.

JEL: J24; J64; O15; O55; I25

Keywords: youth unemployment; skills mismatch; employability skills; livelihood transitions; post-war Sierra Leone; PLS-SEM; Sustainable Livelihoods Framework

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1. Introduction

Youth unemployment and underemployment are some of the most enduring development issues in sub-Saharan Africa. However, the concept of the “youth employment crisis” is contested as it has been defined in different ways, including unemployment, underemployment, missing jobs, lack of decent work, waithood and diverse or mixed livelihoods, each of which suggests a different policy approach (Carraras *et al.*, 2021). The issue is exacerbated in fragile and post-conflict contexts, where education systems, productive assets and institutions have been destroyed, and where the risk of jobless youth being recruited into violent, criminal or antisocial activities exists (Bangura *et al.*, 2023).

Sierra Leone is a case in point. The civil war in the country (1991-2002) affected education and agricultural activities in the rural areas, followed by the Ebola epidemic in 2014-2016 and the COVID-19 pandemic more recently. The evidence from the household surveys indicates that the challenge is not so much about the lack of jobs as about the lack of labour, with youth labour underutilisation at 72.8% among young women and 59.9% among young men in 2015 (International Labour Organization [ILO], 2017), and underemployment being highest among Freetown residents and youth, with informality being widespread and formal employment limited to the most highly educated in 2014 (Statistics Sierra Leone, 2014). Post-conflict livelihood research also reveals that youth livelihood strategies are flexible: youth farmers in Kenema cope with the effects of war and Ebola (Bangura *et al.*, 2023), and artisanal mining communities in Kono adjust to the remnants of diamond mining, potentially leaving youth “stuck in transition” (Maconachie & Conteh, 2025).

This study is motivated by three gaps. First, the available evidence on youth livelihoods in Sierra Leone is largely qualitative or rural and agricultural in focus, with few quantitative, theory-driven tests of the interaction of skills, skills fit and structural conditions in peri-urban settings. Second, the skills-mismatch and employability literatures seldom model structural constraints as an upstream influence on skills formation and skills fit. Third, livelihood transitions are typically considered as outcomes rather than constructs that are empirically associated with labour-market status. Waterloo is a rapidly expanding peri-urban settlement in the Western Area Rural District, which has historically been a place of refuge for displaced persons, and where post-war legacies, proximity to the Freetown labour market and informality converge analytically.

The study therefore asks:

- **RQ1:** To what extent do skills mismatch and employability skills explain youth unemployment and underemployment in Waterloo?
- **RQ2:** How do post-war structural constraints influence skills mismatch, employability skills and youth unemployment and underemployment, directly and indirectly?

- **RQ3:** How are skills mismatch, employability skills, post-war structural constraints and youth unemployment and underemployment associated with livelihood transitions?
- **RQ4:** Does youth unemployment and underemployment mediate the effects of the upstream constructs on livelihood transitions?

The contribution is threefold: (i) an integrated conceptual model that connects three complementary theories; (ii) a validated five-construct measurement instrument for a post-war peri-urban context; and (iii) PLS-SEM evidence on direct, indirect and total effects, including a test of the widespread assumption that unemployment pushes young people into livelihood transitions.

2. Theoretical Foundations and Literature Review

2.1 Human Capital Theory

Human Capital Theory (HCT) considers education, training and health as investments that increase the productivity of individuals and thus their earning and employment opportunities (Becker, 1964; Schultz, 1961). In the youth-employment arena, HCT encourages attention to employability skills: technical, communication, cognitive-adaptive, numeracy-digital and entrepreneurial skills that influence a young person's ability to find and keep a job. Low-income contexts highlight the need for technical and entrepreneurial skills in self-employment and the role of informal learning, including apprenticeships, as a pathway to acquiring these skills (Ngyah-Etchutambe *et al.*, 2022). HCT believes that better employability skills will help to decrease unemployment and underemployment and increase the number of livelihood opportunities. Its boundaries are also informative: signalling and screening perspectives highlight that qualifications do not ensure productivity or employment (Spence, 1973), while in several African contexts, educated youth continue to be vulnerable despite their schooling (Abebe, 2020; Chipangura *et al.*, 2026).

2.2 Skills Mismatch Theory

Skills Mismatch Theory is based on the assignment models of the labour market (Sattinger, 1993), which focus on the match between the quantity of skills and the requirements of jobs. Mismatch can occur vertically (over- or under-education), horizontally (field of study not relevant to work) or in terms of skills under-use, and is linked to lower earnings, poorer job satisfaction and longer spells of non-employment (McGuinness *et al.*, 2018). Even secondary and tertiary graduates may be unable to find jobs in education systems that are not aligned with local needs (Craney, 2021), while young graduates may have “side-hustles” or informal activities in addition to their primary occupations (Chipangura *et al.*, 2026; Yeboah & Boafo, 2024). The theory suggests that the more mismatched, the more unemployment and underemployment, and the more reallocation of mismatched workers to other occupations or sectors.

2.3 Sustainable Livelihoods Framework

The Sustainable Livelihoods Framework (SLF) is a conceptualization of livelihoods as capabilities, assets and activities that enable a means of living, and focuses on five components: the vulnerability context (shocks, trends, seasonality); livelihood assets (human, social, natural, physical, financial capital); transforming structures and processes (institutions, policies, markets); livelihood strategies (including livelihood diversification and migration); and livelihood outcomes (Chambers & Conway, 1992; Department for International Development [DFID], 1999; Scoones, 1998). The vulnerability context is the legacy of war and later epidemics in post-war Waterloo; the weak training infrastructure is a constraining structure and process; the employability skills are human capital; and the livelihood transitions are strategies by which young people adapt. The diversification and migration aspirations of youth with few assets are well documented, as are the cases of youth diversifying while also aspiring to migrate (Karamchedu, 2024; Mukwedeya & Mudhara, 2023; Tilahun & Holden, 2023).

2.4 Theoretical Integration

The three theories are not mutually exclusive. The supply of skills (employability skills) is explained by HCT, whether those skills are usable in the local opportunity structure (skills mismatch) is explained by Skills Mismatch Theory, and why skills formation, skills fit and the labour-market position of youth are conditioned by the wider context and how youth respond through strategies (livelihood transitions) is explained by SLF. Table 1 maps the study constructs onto the theories.

Table 1: Mapping of study constructs to theoretical frameworks

Construct	Primary theory	Conceptual role in the model
Post-war structural constraints (PWC)	SLF	Vulnerability context and constraining structures/processes; exogenous upstream construct
Employability skills (ES)	HCT / SLF human capital	Skills asset; mediator between PWC and outcomes
Skills mismatch (SM)	Skills Mismatch Theory	Fit between skills and local opportunity structure; mediator between PWC and outcomes
Youth unemployment & underemployment (YU)	Mismatch theory / SLF outcome	Labour-market outcome (negative livelihood outcome)
Livelihood transition (LT)	SLF livelihood strategies	Adaptive reconfiguration of livelihood portfolio

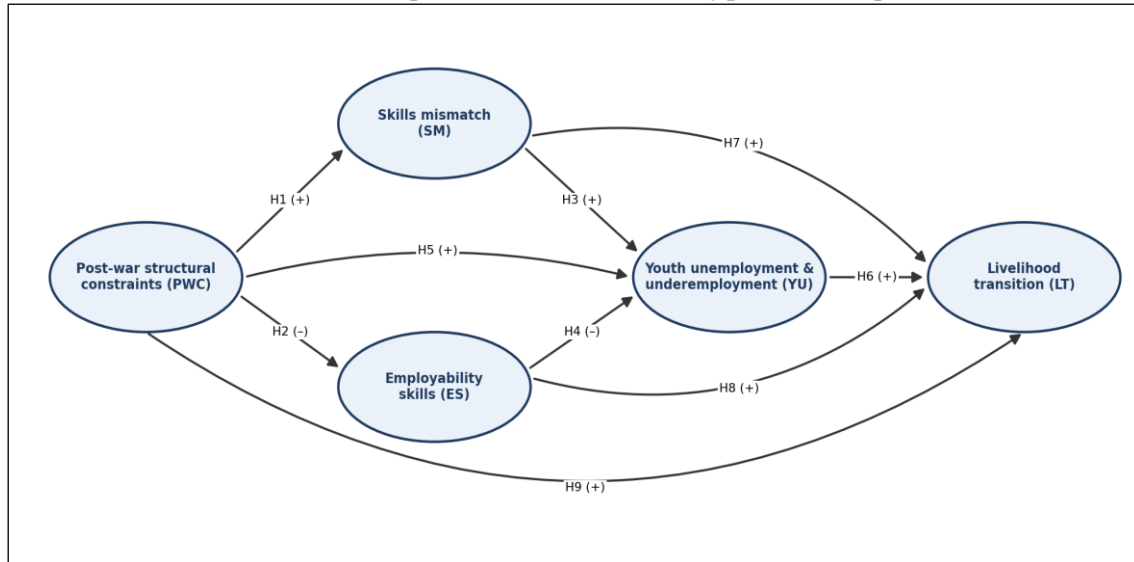
Note: SLF = Sustainable Livelihoods Framework; HCT = Human Capital Theory.

3. Conceptual Framework and Hypotheses

Figure 1 presents the conceptual framework. Post-war structural constraints are positioned as the upstream driver. Consistent with the SLF, they are expected to erode access to quality education and training (lowering employability skills) and to weaken the alignment between education and local labour demand (raising mismatch). Skills and

skills fit then determine labour-market outcomes, and all constructs are linked to livelihood transitions.

Figure 1: Conceptual framework and hypothesised paths



Note: Hypothesised signs in parentheses. Mediation hypotheses (H10–H13) concern indirect effects along these paths.

3.1 Hypotheses

- **H1: (PWC → SM, +).** Stronger post-war structural constraints are associated with greater skills mismatch. Conflict-damaged education systems and weak institutions produce training that is poorly aligned with local labour demand (Craney, 2021).
- **H2: (PWC → ES, -).** Stronger post-war structural constraints are associated with lower employability skills, because damaged training infrastructure and limited resources reduce human-capital accumulation (HCT; SLF).
- **H3: (SM → YU, +).** Greater skills mismatch increases youth unemployment and underemployment (Skills Mismatch Theory).
- **H4: (ES → YU, -).** Stronger employability skills reduce youth unemployment and underemployment (HCT).
- **H5: (PWC → YU, +).** Post-war structural constraints directly increase youth unemployment and underemployment through weak infrastructure, scarce capital and limited networks (SLF).
- **H6: (YU → LT, +).** Youth unemployment and underemployment push young people towards livelihood transitions (distress-driven diversification; Karamchedu, 2024; Tilahun & Holden, 2023).
- **H7: (SM → LT, +).** Greater skills mismatch is associated with more livelihood transitions, as mismatched youth reallocate to other occupations, sectors or places (Skills Mismatch Theory; SLF strategies).

- **H8: (ES → LT, +).** Stronger employability skills are associated with more livelihood transitions, as human capital expands the feasible set of livelihood strategies (SLF; HCT).
- **H9: (PWC → LT, +).** Post-war structural constraints are associated with more livelihood transitions, as shocks and constraints force adaptive diversification. A competing “lock-in” argument (constraints immobilise youth) is acknowledged; the hypothesis is therefore tested with a two-tailed procedure.
- **H10: (mediation through skills).** PWC affects YU indirectly through SM (H10a) and ES (H10b).
- **H11 (mediation through YU).** YU mediates the effects of SM (H11a), ES (H11b) and PWC (H11c) on LT.
- **H12: (mediation through skills to LT).** SM (H12a) and ES (H12b) mediate the effect of PWC on LT.
- **H13: (serial mediation).** PWC affects LT sequentially through SM and YU (H13a) and through ES and YU (H13b).

3.2 Structural Model

The structural model is recursive and estimated with the following equations, where ζ denotes structural residuals and controls (age, gender, education, years since leaving school) are examined in robustness checks:

$$SM = \gamma_1 \cdot PWC + \zeta_1$$

$$ES = \gamma_2 \cdot PWC + \zeta_2$$

$$YU = \beta_1 \cdot SM + \beta_2 \cdot ES + \gamma_3 \cdot PWC + \zeta_3$$

$$LT = \beta_3 \cdot YU + \beta_4 \cdot SM + \beta_5 \cdot ES + \gamma_4 \cdot PWC + \zeta_4$$

4. Methodology

4.1 Research Design and Study Area

A quantitative, cross-sectional, explanatory survey design was adopted, appropriate for testing a theory-derived structural model at a single point in time. The study was conducted in Waterloo, Western Area Rural District, Sierra Leone. The target population comprised young people aged 18–35 years resident in Waterloo, consistent with the national youth age range of 15–35 years (United Nations Population Fund [UNFPA] Sierra Leone, n.d.), with those under 18 excluded for consent reasons.

4.2 Sampling and Data Collection

The final sample comprised $N = 250$ respondents. The respondents were drawn from each Waterloo chiefdom, where the questionnaire was administered to unemployed youths in the five sections of the chiefdom. In each of the sections, 50 questionnaires were administered to ascertain the purpose of the research. The questionnaires were administered in English and Krio, the most used languages in the community. A sample

of 250 exceeds the minimum required by the inverse square-root method for detecting path coefficients of about 0.16 at a 5% significance level with 80% power (Hair *et al.*, 2022) and by the ten-times rule applied to the maximum number of structural paths pointing at a construct (four). The questionnaire was voluntary, and informed consent was sought to get the respondents' willingness to participate in the process. Respondents' data privacy was assured, and as such, the research does not disclose the data privacy of the respondents.

4.3 Instrument and Measurement Model

The questionnaire comprised a demographic section and five multi-item scales, each with five reflective indicators measured on a five-point Likert scale (1 = strongly disagree to 5 = strongly agree). Items were developed from the theoretical definitions in Table 2 and the literature reviewed above. Full item wording is in Appendix A. The constructs are modelled reflectively (Mode A), because the indicators are interchangeable manifestations of a common latent trait and each set is expected to covary.

Table 2: Construct definitions and operationalisation

Construct	Operational definition	Items
Skills mismatch (SM)	Perceived incongruence between the level, field and type of skills held by a young person and those demanded by local labour-market opportunities (vertical, horizontal and skills-use dimensions). Higher = greater mismatch.	SM1–SM5
Post-war structural constraints (PWC)	Perceived legacies of conflict and subsequent shocks that limit young people's access to education, capital, infrastructure, networks and institutional support (the SLF vulnerability context and transforming structures). Higher = stronger constraints.	PWC1–PWC5
Employability skills (ES)	Self-assessed technical, social/communication, cognitive-adaptive, basic numeracy-digital and entrepreneurial skills that make a young person employable (the human-capital asset). Higher = stronger skills.	ES1–ES5
Youth unemployment and underemployment (YU)	Composite labour-underutilisation outcome capturing joblessness, unsuccessful job search, time-related underemployment, inadequate earnings and insecure work. Higher = greater unemployment/underemployment.	YU1–YU5
Livelihood transition (LT)	Intensity of adaptive shifts in livelihood portfolio: changing main income source, diversifying, changing occupation/sector, adopting new activities and spatial relocation (the SLF livelihood strategy). Higher = more transition activity (not necessarily upward mobility).	LT1–LT5

4.4 Data Analysis

Analysis followed the two-stage PLS-SEM procedure (Hair *et al.*, 2019, 2022) using SmartPLS 4 (Ringle *et al.*, 2024). PLS-SEM was selected because the study is theory-extending and prediction-oriented; the model contains multiple mediators and five latent constructs with 25 indicators, and PLSpredict allows assessment of out-of-sample predictive power. Item skewness (range –0.13 to 0.22) and excess kurtosis (–0.55 to 0.38)

indicated approximately normal indicator distributions, so the choice of PLS-SEM does not rest on non-normality. The path-weighting scheme was used with unit initial weights and a stop criterion of 10^{-7} . Significance was assessed with 5,000 bootstrap subsamples (percentile 95% confidence intervals, two-tailed).

4.4.1 Stage 1 (measurement model)

Indicator reliability (loadings ≥ 0.70 , with 0.60–0.70 retained where content validity and AVE justify), internal consistency (Cronbach's α , ρ_A and composite reliability between 0.70 and 0.95), convergent validity (AVE ≥ 0.50) and discriminant validity (Fornell–Larcker criterion, cross-loadings, HTMT < 0.85 ; Fornell & Larcker, 1981; Henseler *et al.*, 2015; Dijkstra & Henseler, 2015).

4.4.2 Stage 2 (structural model)

Collinearity (inner VIF < 3), path coefficients and their bootstrap significance, R^2 , effect size f^2 (0.02/0.15/0.35; Cohen, 1988), specific indirect effects with mediation typology (Zhao *et al.*, 2010), out-of-sample predictive power via PLSpredict (Shmueli *et al.*, 2019), and SRMR. Common-method bias was examined through full-collinearity VIFs (threshold 3.3; Kock, 2015; see also Podsakoff *et al.*, 2003). Robustness checks comprised a control-variable specification and a permutation-based multi-group comparison by gender.

5. Results

5.1 Data Screening and Sample Profile

The dataset contained no missing values across the 250 cases and 25 indicators, and no straight-lining screening flags were raised at the construct level.

Table 3: Sample profile (N = 250)

Variable	Category / statistic	n or value	%
Age (years)	Mean (SD)	26.2 (5.5); range 18–35	
Gender†	Male (code 1)	135	54.0%
	Female (code 2)	115	46.0%
Education†	Level 1: No formal / primary only	17	6.8%
	Level 2: Junior secondary	46	18.4%
	Level 3: Senior secondary	78	31.2%
	Level 4: Vocational / post-secondary	84	33.6%
	Level 5: University degree	25	10.0%
Employment status†	Unemployed	84	33.6%
	Self employed	71	28.4%
	Business owner	66	26.4%
	Currently employed	29	11.6%
Years since leaving school	Mean (SD)	5.4 (3.3)	

† Category labels for gender, education and employment status should be confirmed against the survey codebook; the data file supplies numeric codes only.

Table 3 summarises the sample: mean age was 26.2 years (SD = 5.5), 54.0% were male, and most respondents had completed senior secondary or post-secondary education (74.8% at level 3 or above).

5.2 Measurement Model

All indicator loadings were significant at $p < .001$ and ranged from 0.691 to 0.843 (Table 4). Only LT5 (relocation) fell marginally below 0.70 (0.691); it was retained because it contributes distinct content (spatial mobility), and construct AVE and CR were well above thresholds. Cronbach's α (0.824–0.871), ρ_A (0.829–0.873) and CR (0.876–0.906) indicate satisfactory internal consistency without redundancy, and AVE values (0.586–0.660) support convergent validity.

Table 4: Measurement model: reliability and convergent validity

Construct	Item	Loading	t	α	ρ_A	CR	AVE
Skills mismatch (SM)	SM1	0.793	32.26	0.824	0.829	0.876	0.586
	SM2	0.759	23.88				
	SM3	0.746	24.14				
	SM4	0.794	32.63				
	SM5	0.734	19.88				
Post-war structural constraints (PWC)	PWC1	0.793	32.69	0.848	0.853	0.891	0.621
	PWC2	0.763	22.66				
	PWC3	0.829	37.75				
	PWC4	0.784	28.90				
	PWC5	0.769	25.34				
Employability skills (ES)	ES1	0.787	29.14	0.829	0.830	0.879	0.593
	ES2	0.739	19.71				
	ES3	0.792	30.14				
	ES4	0.784	30.45				
	ES5	0.748	23.62				
Youth unemployment and underemployment (YU)	YU1	0.781	29.22	0.871	0.873	0.906	0.660
	YU2	0.814	38.92				
	YU3	0.835	47.02				
	YU4	0.787	27.61				
	YU5	0.843	43.72				
Livelihood transition (LT)	LT1	0.775	26.27	0.833	0.842	0.882	0.601
	LT2	0.777	25.39				
	LT3	0.825	34.72				
	LT4	0.802	34.52				
	LT5	0.691	17.15				

Note: Bootstrap $n = 5,000$. All loadings $p < .001$. CR = composite reliability; AVE = average variance extracted.

Discriminant validity was established (Table 5). The square root of each construct's AVE (0.766–0.812) exceeded its highest inter-construct correlation (0.507), every indicator loaded most strongly on its own construct (Appendix B), and the highest HTMT ratio was 0.597, well below 0.85.

Table 5: Discriminant validity: Fornell–Larcker (lower triangle, diagonal = $\sqrt{\text{AVE}}$) and HTMT

	SM	PWC	ES	YU	LT
SM	0.766				
PWC	0.340	0.788			
ES	-0.065	-0.219	0.770		
YU	0.507	0.435	-0.482	0.812	
LT	0.390	0.266	0.237	0.147	0.775

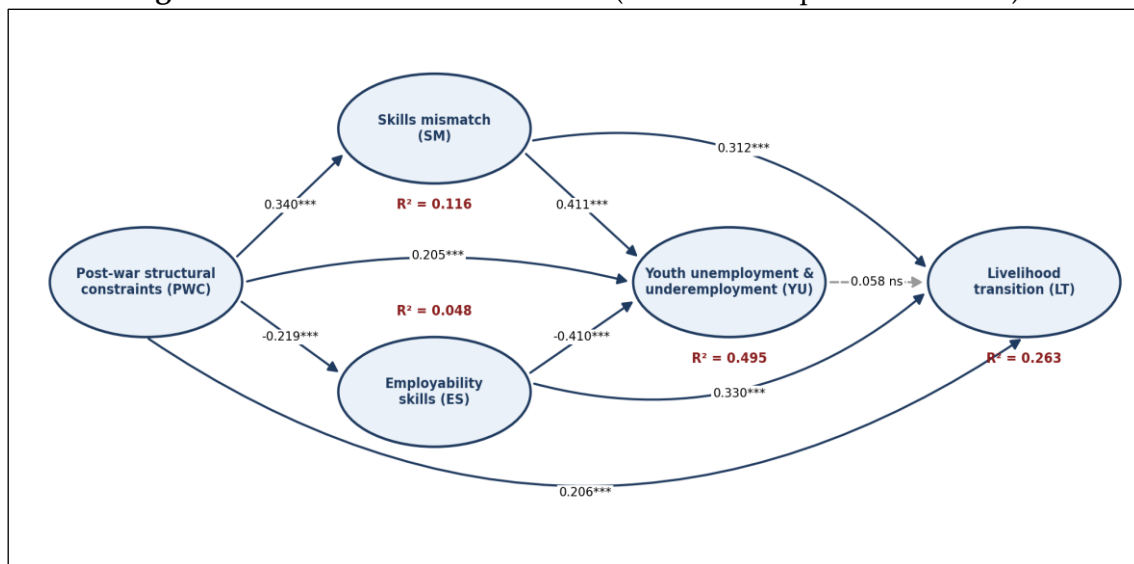
HTMT	SM	PWC	ES	YU	LT
SM					
PWC	0.397				
ES	0.131	0.262			
YU	0.597	0.502	0.563		
LT	0.467	0.306	0.284	0.172	

Note: Fornell–Larcker panel above; HTMT panel below (all values < 0.85).

5.3 Structural Model

Inner VIF values were between 1.05 and 1.98 (Appendix C), and full-collinearity VIFs did not exceed 1.99, so neither multicollinearity nor common-method bias is a concern under the criteria adopted. The SRMR of the saturated model was 0.058, below the 0.08 guideline.

Figure 2: Estimated structural model (standardised path coefficients)



Note: *** $p < .001$; ns = not significant. Dashed grey = non-significant path. Indicators and loadings are reported in Table 4.

Table 6 reports the hypothesis tests. PWC significantly increased skills mismatch ($\beta = 0.340$) and reduced employability skills ($\beta = -0.219$), supporting H1 and H2. Skills mismatch ($\beta = 0.411$, $f^2 = 0.30$) and employability skills ($\beta = -0.410$, $f^2 = 0.32$) were the dominant, near-symmetric predictors of YU (H3, H4), and PWC retained a smaller direct effect ($\beta = 0.205$; H5). For livelihood transitions, SM ($\beta = 0.312$), ES ($\beta = 0.330$) and PWC

($\beta = 0.206$) had significant positive effects (H7–H9), whereas YU had no significant effect ($\beta = 0.058$, 95% CI $[-0.087, 0.216]$, $p = .454$; $f^2 = 0.002$), so H6 was not supported.

Table 6: Direct effects and hypothesis testing

Hyp.	Path	Exp.	β	SE	t	p	95% CI	f^2	Decision
H1	PWC $\rightarrow$ SM	+	0.340	0.059	5.77	<.001	[0.226, 0.458]	0.131	Supported
H2	PWC $\rightarrow$ ES	–	–0.219	0.061	–3.60	<.001	[–0.342, –0.101]	0.050	Supported
H3	SM $\rightarrow$ YU	+	0.411	0.040	10.33	<.001	[0.331, 0.486]	0.295	Supported
H4	ES $\rightarrow$ YU	–	–0.410	0.044	–9.36	<.001	[–0.495, –0.324]	0.316	Supported
H5	PWC $\rightarrow$ YU	+	0.205	0.047	4.41	<.001	[0.112, 0.293]	0.071	Supported
H6	YU $\rightarrow$ LT	+	0.058	0.077	0.75	.454	[–0.087, 0.216]	0.002	Not supported
H7	SM $\rightarrow$ LT	+	0.312	0.065	4.81	<.001	[0.182, 0.435]	0.086	Supported
H8	ES $\rightarrow$ LT	+	0.330	0.061	5.39	<.001	[0.216, 0.452]	0.105	Supported
H9	PWC $\rightarrow$ LT	+	0.206	0.059	3.50	<.001	[0.091, 0.324]	0.045	Supported

Note: Percentile bootstrap, 5,000 subsamples, two-tailed. Exp. = expected sign.

The model explained 49.5% of the variance in YU ($R^2 = 0.495$; moderate to substantial), 26.3% in LT ($R^2 = 0.263$; weak to moderate), 11.6% in SM and 4.8% in ES. The modest R^2 values for SM and ES are expected given that only one antecedent was specified; they signal that other determinants of skills formation (e.g., school quality, household resources) lie outside the model.

5.4 Mediation Analysis

Table 7 shows that the effect of PWC on YU is substantially transmitted through skills: the indirect effects via SM ($\beta = 0.140$) and ES ($\beta = 0.090$) were both significant, and, alongside a significant direct effect, indicate complementary partial mediation (H10a, H10b). The total effect of PWC on YU was 0.435, of which 53% was indirect. In contrast, YU did not mediate any effect on LT (H11a–c), and the serial paths were non-significant (H13a–b). PWC affected LT indirectly through SM (positive; complementary partial mediation) and through ES (negative; competitive partial mediation, since the direct effect is positive and the indirect effect negative), supporting H12a and H12b. These offsetting indirect effects explain why the total effect of PWC on LT (0.266) is only modestly larger than its direct effect.

Table 7: Specific indirect effects

Hyp.	Path	β	SE	t	p	95% CI	Decision
H10a	PWC $\rightarrow$ SM $\rightarrow$ YU	0.140	0.029	4.87	<.001	[0.088, 0.202]	Supported
H10b	PWC $\rightarrow$ ES $\rightarrow$ YU	0.090	0.028	3.22	.001	[0.039, 0.149]	Supported
H11a	SM $\rightarrow$ YU $\rightarrow$ LT	0.024	0.033	0.73	.465	[–0.035, 0.091]	Not supported
H11b	ES $\rightarrow$ YU $\rightarrow$ LT	–0.024	0.032	–0.74	.458	[–0.089, 0.037]	Not supported
H11c	PWC $\rightarrow$ YU $\rightarrow$ LT	0.012	0.017	0.72	.471	[–0.019, 0.047]	Not supported
H12a	PWC $\rightarrow$ SM $\rightarrow$ LT	0.106	0.029	3.61	<.001	[0.055, 0.170]	Supported
H12b	PWC $\rightarrow$ ES $\rightarrow$ LT	–0.072	0.024	–2.98	.003	[–0.127, –0.030]	Supported
H13a	PWC $\rightarrow$ SM $\rightarrow$ YU $\rightarrow$ LT	0.008	0.011	0.71	.480	[–0.013, 0.033]	Not supported
H13b	PWC $\rightarrow$ ES $\rightarrow$ YU $\rightarrow$ LT	0.005	0.008	0.68	.496	[–0.008, 0.022]	Not supported

Note: Mediation types (Zhao *et al.*, 2010) are given in the text. Total effects are point estimates.

5.5 Predictive Power

PLSpredict (10 folds) gave positive Q^2_{predict} for all YU indicators (0.086–0.125) and values close to zero for LT indicators (–0.008–0.060) (Table 8). For every indicator, the PLS-SEM RMSE exceeded that of the linear-model benchmark, which, under the (Shmueli *et al.*, 2019) guidelines, indicates low out-of-sample predictive power. The model should therefore be interpreted primarily as explanatory rather than predictive, and the exclusion of important antecedents of transitions is likely.

Table 8: PLSpredict results for endogenous indicators

Indicator	Q^2_{predict}	RMSE (PLS)	RMSE (LM)	PLS – LM
YU1	0.111	0.761	0.682	0.080
YU2	0.086	0.723	0.680	0.042
YU3	0.104	0.752	0.661	0.091
YU4	0.111	0.749	0.717	0.032
YU5	0.125	0.727	0.644	0.083
LT1	–0.008	0.783	0.752	0.030
LT2	0.031	0.765	0.736	0.028
LT3	0.036	0.793	0.780	0.013
LT4	0.060	0.749	0.727	0.022
LT5	0.014	0.769	0.769	0.001

5.6 Robustness Checks

Adding age, gender, education and years since leaving school as controls left the substantive pattern unchanged (YU: PWC = 0.203, SM = 0.398, ES = –0.400; LT: PWC = 0.214, SM = 0.305, ES = 0.336, YU = 0.060); no control coefficient exceeded 0.13 in absolute value. A permutation-based multi-group comparison (1,000 permutations) found no significant gender differences in any path (all $p > .201$; Appendix D), although measurement invariance (MICOM) should be confirmed in SmartPLS before publication. One diagnostic warrants candour. Respondents' employment-status category did not discriminate YU scores (one-way ANOVA $F = 1.34$, $p = .261$), and demographic variables were only weakly related to the constructs. This known-groups result does not support the criterion validity of the YU scale (or of the employment-status coding) and is discussed under limitations.

6. Discussion

Labour-market outcomes (RQ1) are jointly determined by skills and skills fit. The strongest predictors of unemployment and underemployment were skills mismatch and employability skills, with nearly identical and opposite effect sizes ($f^2 \approx 0.30$ and 0.32). This is consistent with the combined prediction of the Human Capital Theory and the Skills Mismatch Theory: skills are required, but not enough; skills are also required to be compatible with the local opportunity structure. This finding aligns with the evidence that formal education is not aligned with the local needs, which results in the lack of employment for educated youth (Craney, 2021); that educated youth remain precarious

(Abebe, 2020; Chipangura *et al.*, 2026); and that technical and entrepreneurial skills are both required for self-employment (Ngyah-Etchutambe *et al.*, 2022).

Skills channels (RQ2) are the primary way that post-war constraints operate. The direct impact of PWC on YU was significant, but 53% of the overall impact of PWC on YU was indirect via increased mismatch and reduced employability skills. This provides quantitative substance to the SLF assertion that the vulnerability context and transforming structures influence outcomes by influencing asset formation and the match between assets and opportunities. It also implies that the legacies of the war are not just “out there” in the economy, but “in here” in the training and education pipeline. Despite the relatively low R^2 for SM and ES, the results do not allow for overattributing skills deficits to the war alone, 20 years later.

Livelihood transitions are not linked to unemployment (RQ3–RQ4). The most theoretically significant finding is the null effect of YU on LT ($\beta = 0.058$) and the lack of mediation by YU. Other things being equal, young people in Waterloo who are more likely to be unemployed or underemployed are not more likely to report changing or diversifying their livelihoods. Rather, transitions were linked to mismatch (mobility to a different occupation or sector than trained for), to employability skills (mobility based on skills), and to post-war constraints (shock-induced adaptation). This pattern is consistent with a reading of transitions as portfolio reconfiguration, with both push and capability dimensions, rather than as a straightforward transition between employment and unemployment, and aligns with work that suggests that early livelihood building is complex and precarious for young Africans, not a simple process of moving between employment and unemployment (Carreras *et al.*, 2021), that graduates engage in both informal and primary activities (Yeboah & Boafo, 2024), and that diversification can leave youth “*stuck in transition*” (Maconachie & Conteh, 2025). The competitive mediation through ES (positive direct, negative indirect) also demonstrates that constraints drive youth to adapt, and they also weaken the skills that would enable them to adapt.

An important interpretive note is that LT is measured as the level of transition activity, rather than as upward mobility or welfare improvement. The current information does not reveal whether transitions have a positive impact on livelihoods, and the positive relationship with mismatch in particular is consistent with diversification in response to distress. The study thus suggests a conceptual separation between underemployment and transition, and recommends outcome measures (income, security, assets) that reflect the quality of transitions.

6.1 Theoretical Implications

HCT is extended by demonstrating that the labour-market returns to employability skills depend on fit (Skills Mismatch Theory) and are influenced upstream by structural context (SLF).

The SLF is implemented as a testable structural model, where the vulnerability context works through human-capital and fit channels, and livelihood strategies are empirically distinct from labour-market outcomes.

Livelihood transitions should be treated as a construct, rather than a proxy for unemployment.

6.2 Policy and Practical Implications

6.2.1 Match Training to Local Needs

The mismatch and skills are equally important; therefore, TVET and apprenticeship programmes should be designed with local employers and sector data, and technical, digital and entrepreneurial content should be integrated (Ngyah-Etchutambe *et al.*, 2022). Rebuild the skills pipeline. Training infrastructure, credit access and institutional support are investment areas that tackle the constraints that lead to feed mismatch and skills deficits.

Support transitions, not placements. Transitions are not just a response to unemployment; interventions should include livelihood portfolios (e.g., business development services, savings and credit, labour-market information for movers) as well as job matching.

6.2.2 Monitor Underemployment

Programme evaluation should measure the adequacy of earnings, hours and security, not just employment.

6.3 Limitations and Future Research

First, the cross-sectional design does not allow for causal inference: the direction of the paths is theoretically justified but not temporally substantiated, and reverse causality is possible (e.g., skills being lost due to prolonged unemployment). Second, all constructs are self-reported and perceptual; while the full collinearity VIFs indicate that there is not a lot of method bias, objective measures (earnings, hours, qualification level versus job requirements) would enhance validity. Third, sampling was non-probabilistic / describe, and so generalisation beyond Waterloo is to be treated with caution. Fourth, the known-groups check reported in Section 5.6 did not provide evidence for the criterion validity of the YU scale or the employment-status coding, and demographics demonstrated weak relationships with the constructs; this should be explored using the original codebook and preferably with objective labour-force classifications. Fifth, the structural specification was completed with the dataset in mind; the model should be considered to be replicable in an independent sample. Sixth, predictive power was limited, particularly for LT, reflecting the absence of antecedents like household assets, social capital, gender norms, migration networks and access to finance. Panel or mixed methods designs could be used in future research, as could testing upward mobility outcomes, investigating moderators (gender, education level, displacement history), and comparing Waterloo with rural and provincial urban sites, as well as using covariance-based or consistent PLS estimators as a sensitivity check.

7. Conclusion

This study demonstrates that in post-war Waterloo, the main drivers of youth unemployment and underemployment are skills mismatch and employability skills, both of which are equally important, and that post-war structural constraints have a direct effect on youth unemployment and underemployment, but also have a more significant indirect effect through the skills mismatch and employability skills channels; and that livelihood transitions are driven by a different logic than unemployment, as they are linked to skills mismatch, employability skills and structural constraints, but not to unemployment status. Policy that focuses only on job creation will therefore overlook the skills-alignment and livelihood-portfolio aspects that are key to youth outcomes.

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Conflict of Interest Statement

The authors declare no conflicts of interest.

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Appendix A. Questionnaire

Section A: Respondent profile. Age (years); gender (1 = male, 2 = female); highest education completed (1–5); current employment status (1–4); years since leaving school/training.

Section B: Scales. Please indicate your agreement with each statement: 1 = Strongly disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly agree.

Skills mismatch (SM)

Code	Item
SM1	The skills I acquired through my education or training do not match the jobs available in Waterloo and the wider Western Area.
SM2	My highest qualification is not relevant to the kind of work I can realistically find.
SM3	Employers in my area require skills that I have not had the opportunity to learn.
SM4	In my current or most recent work I use only a small part of my education and skills.
SM5	My education or training did not prepare me for the practical demands of the labour market.

Post-war structural constraints (PWC)

Code	Item
PWC1	Damaged or weak education and training facilities in my community limited my skills development.
PWC2	Lack of start-up capital or credit prevents me from finding or creating work.
PWC3	Poor infrastructure and public services (roads, electricity, markets) limit local job opportunities.
PWC4	The legacy of the civil war and later shocks (Ebola, COVID-19) has reduced job opportunities for young people in my community.
PWC5	Weak social networks and limited institutional support (local government, youth programmes) restrict my access to jobs.

Employability skills (ES)

Code	Item
ES1	I have technical or vocational skills that employers or customers in my area value.
ES2	I communicate effectively and work well with others.
ES3	I can solve problems and adapt quickly to new tasks at work.
ES4	I have the basic numeracy and digital skills needed for work today.
ES5	I have entrepreneurial skills (spotting opportunities, managing money) that help me earn a living.

Youth unemployment and underemployment (YU)

Code	Item
YU1	Since leaving school or training I have spent long periods without any paid work.
YU2	I actively look for work but rarely find it.
YU3	My work does not provide enough hours for me to earn what I need.
YU4	My earnings from work are too low to meet my basic needs.
YU5	My work is irregular or insecure, and I would take more or better work if it were offered.

Livelihood transition (LT)

Code	Item
LT1	In the past two years I have changed my main source of income.
LT2	I combine several income activities (e.g., trading, farming, casual labour, transport) to make ends meet.
LT3	I have moved into an occupation or sector different from my education or earlier work.
LT4	I have taken up new livelihood activities to improve my household's living conditions.
LT5	I have moved, or seriously considered moving, to another place (e.g., Freetown) to pursue better livelihood opportunities.

Note: Higher scores indicate greater mismatch (SM), stronger constraints (PWC), stronger skills (ES), greater unemployment/underemployment (YU) and more transition activity (LT). No items are reverse-coded. [Confirm that the wording above matches the instrument actually administered.]

Appendix B. Cross-loadings

Item	PWC	SM	ES	YU	LT
PWC1	0.793	0.293	-0.206	0.353	0.191
PWC2	0.763	0.176	-0.207	0.317	0.111
PWC3	0.829	0.286	-0.149	0.401	0.263
PWC4	0.784	0.299	-0.174	0.333	0.206
PWC5	0.769	0.268	-0.134	0.300	0.256
SM1	0.278	0.793	-0.118	0.468	0.304
SM2	0.288	0.759	0.020	0.346	0.336
SM3	0.199	0.746	-0.071	0.409	0.220
SM4	0.313	0.794	0.003	0.351	0.360
SM5	0.210	0.734	-0.084	0.366	0.262
ES1	-0.188	-0.123	0.787	-0.404	0.144
ES2	-0.115	0.025	0.739	-0.309	0.253
ES3	-0.174	-0.109	0.792	-0.409	0.141
ES4	-0.149	-0.053	0.784	-0.394	0.155
ES5	-0.212	0.023	0.748	-0.330	0.229
YU1	0.357	0.418	-0.386	0.781	0.115
YU2	0.324	0.375	-0.367	0.814	0.084
YU3	0.352	0.426	-0.428	0.835	0.114
YU4	0.348	0.408	-0.348	0.787	0.184
YU5	0.383	0.429	-0.421	0.843	0.100
LT1	0.129	0.328	0.163	0.135	0.775
LT2	0.201	0.289	0.209	0.096	0.777
LT3	0.235	0.294	0.242	0.134	0.825
LT4	0.267	0.339	0.163	0.117	0.802
LT5	0.184	0.260	0.127	0.085	0.691

Appendix C. Inner collinearity (VIF)

Outcome	PWC	SM	ES	YU
YU	1.18	1.13	1.05	–
LT	1.27	1.47	1.38	1.98

Appendix D. Multi-group comparison by gender (permutation test)

Path	β male	β female	Difference	p (perm.)
PWC → SM	0.319	0.354	-0.036	.772
PWC → ES	-0.142	-0.306	0.165	.201
PWC → YU	0.190	0.214	-0.023	.803
PWC → LT	0.279	0.134	0.145	.203
SM → YU	0.406	0.418	-0.013	.901
ES → YU	-0.423	-0.399	-0.023	.790
SM → LT	0.265	0.382	-0.117	.368
ES → LT	0.317	0.354	-0.037	.780
YU → LT	0.056	0.063	-0.006	.977

Appendix E. SmartPLS 4 replication protocol

1. Import the CSV; set missing-value handling to none (no missing data). Create five reflective constructs: SM1–SM5, PWC1–PWC5, ES1–ES5, YU1–YU5, LT1–LT5.
2. Draw the nine structural paths in Table 6: PWC→SM, PWC→ES, PWC→YU, PWC→LT, SM→YU, ES→YU, SM→LT, ES→LT, YU→LT.
3. PLS-SEM algorithm: path weighting scheme; maximum iterations 3,000; stop criterion 10^{-7} ; initial weights 1.0.
4. Bootstrapping: 5,000 subsamples; complete bootstrapping; percentile bootstrap; two-tailed; significance level 0.05; random seed fixed.
5. PLSpredict: 10 folds, 10 repeats. MICOM followed by MGA (permutation) with Gender as grouping variable.
6. Report: loadings, α /qA/CR/AVE, HTMT, Fornell–Larcker, VIF, path coefficients, specific indirect effects, R^2 , f^2 , PLSpredict, SRMR. Update Tables 4–8 with SmartPLS output if values differ in the third decimal.