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Contextually Sensitive Polyvictimization Profiles and Physical and Mental Health Outcomes among South African Adolescents from Low-Resource Communities: An Extended Latent Class Analysis

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Abstract

Adolescents in South Africa may experience violence victimizations in many forms (abuse, bullying, assault) and across many contexts (home, school, community). Polyvictimization is a valuable framework to examine the diversity of violence in adolescents' lives, particularly when employed alongside person-centered methods such as latent class analysis. This study builds on previous work examining contextually sensitive patterns of polyvictimization among South African adolescents and uses longitudinal Young Carers data (n=3401) from highly-deprived, low-resource settings to investigate the associations between latent class polyvictimization profiles and physical and mental health outcomes using the Bolck–Croon–Hagenaars (BCH) method. Key results found that adolescents who experienced high polyvictimization alongside contextual factors (poverty, disability, etc.) had greater odds of suicidality and higher scores for depression and anxiety measures than their peers who experienced moderate or low polyvictimization. These outcomes were often worse within the high polyvictimization classes for those participants experiencing burdens of HIV/AIDS and disability. Results were mixed for the physical health outcomes (chronic health condition; recent poor health) and when distinguishing between the moderate and low polyvictimization classes, as some classes characterized by decreased polyvictimization had worse health outcomes. These findings highlight the need to consider polyvictimization as a relevant health risk and contextual factor when addressing the health and well-being needs of South African adolescents. Health programming and policy efforts should seek to screen for and address the causes of and distress from polyvictimization when targeting adolescents and provide a cohesive response to the adolescent violence and health burdens in low-resource communities.

Extended author information available on the last page of the article

Keywords Adolescent · Violence · Abuse · Bullying · Polyvictimization · Health

1 Background

Violence experienced in early childhood and through adolescence is a recognized public health concern and has been linked with poor physical and mental health effects in adolescence and into adulthood (Hughes et al., 2017; Kessler et al., 2010; Leeb et al., 2011; Norman et al., 2012). In highly-deprived, low-resource communities in South Africa, many adolescents experience the burden and health effects of violence—previous work has demonstrated a high prevalence of violence among these adolescents (Meinck et al., 2016)—in addition to those of HIV/AIDS, poverty, and limited educational and social supports, all of which place their health at risk throughout childhood (Panday et al., 2013; Ward et al., 2015). Experiences of violence victimization have been linked to poor mental health and potentially risky health behaviors among South African adolescents (Boyes et al., 2019; Cluver et al., 2018; Herrero Romero et al., 2019; Humm et al., 2018; Liang et al., 2007).

As adolescents inhabit a vulnerable and transitional life stage in which they move from early childhood to greater independence and responsibilities as young adults, the burdens and life experiences of this period can pose a significant risk to their health and well-being outcomes and those further across the life course (Hardgrove et al., 2014; Povey et al., 2022). In South Africa, experiences of violence in early childhood and adolescence have measurable effects on the health of individuals who shoulder increased risks of depression, substance abuse, sexually transmitted infections, including HIV, and self-harm (Hoosen et al., 2022; Hsiao et al., 2018). These violent events also have measurable negative effects on the health and economic well-being of individuals' communities and of South Africa at large (Hsiao et al., 2018). Violence in early childhood and adolescence is often not isolated to a single form, and many young people experience multiple forms of violence and/or abuse before adulthood, including violence/abuse in their homes, schools, and communities (Alexander et al., 2021; Finkelhor et al., 2007a; Hamby & Grych, 2013; Higgins et al., 2023; Turner et al., 2016). In South Africa, previous experiences of violence exposure or victimization and/or residing in a high-violence community increased adolescents' risk of subsequent violence victimization experiences (Cluver et al., 2010; Meinck et al., 2015).

In considering the violence in South Africa and its links to contextual factors such as poverty and HIV/AIDS, it is necessary to examine these factors within their historical context of the recent South African apartheid and subsequent post-apartheid challenges. Racist apartheid policies of political, social, and economic discrimination of populations classified as “Black”, “Indian”, or “Coloured” were in place until 1991, and the legacy of apartheid in the post-apartheid South African era has resulted in ongoing racial and economic inequality, including markedly high poverty levels among Black populations (Baker, 2010; Gumede, 2021). These socio-economic inequalities have been linked to poor health and health inequalities across the post-apartheid era with the high prevalence of gender-based violence and violence against children being potentially linked to poverty and income inequality (Das-Munshi et al.,

2016; Omotoso & Koch, 2018). Additionally, this post-apartheid era has been marked by a substantial HIV/AIDS epidemic and a large proportion of AIDS-orphaned children with demonstrated associations between poverty and HIV infection (Cluver & Operario, 2008; Cluver et al., 2008). This epidemic should also be considered with a historical lens, as research has indicated that infection, most prevalent among Black South Africans, has been driven by segregation and racist policies and the inaccessibility of adequate prevention and intervention with HIV treatment not available for free until 2004 (Bell et al., 2022). Further, due to these policies and barriers, South Africa has the largest population of adolescents living with HIV with AIDS-related mortality doubling among adolescents between 2005–2015 (Pantelic et al., 2017). Thus, poverty, HIV/AIDS, violence, and other contextual factors impacting adolescents and their communities cannot be properly examined without considering the systemic discrimination that characterized apartheid in South Africa and the continuing impacts and challenges felt in the post-apartheid era due to these historical policies.

Given the overlapping and intersecting nature of violence in their lives, the polyvictimization framework is a valuable tool with which to examine the nature of adolescent violence, as it allows for the inclusion of multiple forms of violence and victimization events across many settings and contexts (Finkelhor et al., 2011). The polyvictimization framework seeks to consider the nature of adolescent violence victimization in a holistic manner by broadly including violence that occurs in the adolescent's family, peer groups, romantic/sexual partnerships, schools, and communities (Willie et al., 2017). Polyvictimization has been operationalized in a diversity of ways in research studies (Song et al., 2022; Willie et al., 2017). This study defines adolescent polyvictimization as an adolescent experiencing multiple forms of violence victimization, across the categories of child abuse, community violence, domestic violence/partner violence, and/or peer violence (Dierkhising et al., 2019; Lasky et al., 2021).

Much of the previous work in adolescent polyvictimization has been conducted in high-income settings, such as the United States and Europe (Butcher et al., 2016; Charak et al., 2019; Finkelhor et al., 2007b; Ford et al., 2013; Kretschmar et al., 2017; Le et al., 2018; Sui et al., 2021). A systematic review of polyvictimization in low- and lower-middle-income contexts demonstrated that adolescent polyvictimization in these settings was more prevalent than in high-income settings; in African countries, estimates ranged from 47 to 63% prevalence in samples drawn from the Democratic Republic of the Congo, Kenya, Sierra Leon, Tanzania, and Uganda (Le et al., 2018). Though South African samples were not included in the review, previous studies with South African adolescents found a high prevalence of violence in their lives spread across many contexts (home, school, community) with adolescent samples experiencing low (29%), high (23%) or very high (13%) polyvictimization and only approximately one-third experiencing no violence or a single victimization (36%; Kaminer et al., 2013; Leoschut & Kafaar, 2017; Sui et al., 2021). Polyvictimization among South African secondary school students has been found to be associated with a diagnosis of post-traumatic stress disorder (PTSD; Collings et al., 2014). Using the lens of polyvictimization, previous work grounded in a contextually sensitive analysis demonstrated a diverse constellation of violence polyvictimiza-

tion sub-groups among South African adolescents from low-resource communities (Franchino-Olsen et al., 2024).

As shown previously, considering the interconnected and overlapping nature of violence victimizations via the polyvictimization framework allows researchers to more holistically capture the breadth and diversity of violence in adolescents' lives and offers the flexibility to consider the contextually specific violence or victimizations they may experience (Butcher et al., 2016; Davis et al., 2019; Franchino-Olsen et al., 2024). It also provides space to consider associated factors of violence—such as poverty and education—that play a key role in the circumstances of and available supports in an adolescent's life (Butcher et al., 2016; Davis et al., 2019). Polyvictimization theory hypothesizes that adolescents who experience multiple forms of violence are more likely to have more severe and/or longer-term health effects than those experiencing one type of violence (Alexander et al., 2021; Butcher et al., 2016; Davis et al., 2019; Finkelhor et al., 2007a, b). This has been demonstrated among South African adolescents, as well, where polyvictimization was found to be linked with worse mental health symptoms (Sui et al., 2021). Researchers have previously captured the complex and diverse patterns of polyvictimization and potentially relevant violence factors via mixture modelling (e.g., latent class analysis; growth mixture modelling), as this allows examination of heterogeneous experiences of victimization (Butcher et al., 2016; Davis et al., 2019). Latent class analysis and other person-centered methods are particularly useful when seeking to understand the complex patterns of violence potentially occurring when examining polyvictimization, as they offer an empirically-based approach to illuminating heterogeneous groups within a sample (Davis et al., 2019; Willie et al., 2017). This is particularly true when seeking to ground our understanding of violence in the contextual factors and burdens such as poverty and HIV/AIDS, as these drivers of violence and poor health are epidemics themselves, and there is wide variation in how individuals experience these risks due to their relative position within the socio-political context in which they reside (Brown et al., 2023). Thus, it is essential to integrate consideration of contextual risk or protective factors within any exploration of violence and health outcomes, as it accounts for the structural issues faced by the diverse sub-groups within the sample. Though previous work has examined the patterns of polyvictimization among South African adolescents (Franchino-Olsen et al., 2024), to our knowledge no study has investigated the links between polyvictimization and health outcomes using a person-centered analysis via mixture modelling among South African adolescents living in low-resource communities, including rural communities, marked by significant burdens of HIV/AIDS and poverty. This study also serves as the first validation of these polyvictimization classes detected in a South African sample (Franchino-Olsen et al., 2024) to demonstrate their relevance in the broader health of adolescents.

1.1 Classes of Polyvictimization

Using data from a sample of South African adolescents living in low-resource, highly deprived communities, this study builds on a previous (original) latent class analysis (LCA) investigation into the patterns of adolescent polyvictimization (via violence across home, school, and community) while accounting for the contextual features

of the adolescents, their homes, and communities. The original LCA established a 7-class solution with classes characterized by adolescents experiencing three approximate levels of polyvictimization: high polyvictimization, reflected in the violence patterns of two of the seven classes; moderate polyvictimization, reflected in the violence patterns of four of the seven classes; and low polyvictimization, reflected in the violence pattern of one of the seven classes (Franchino-Olsen et al., 2024). The 7-class solution was modelled to be contextually sensitive in that it considered factors beyond violence in the creation of the latent class model. Specifically, patterns of violence polyvictimization were examined alongside meaningful patterns of contextual risk and protective factors, such as poverty, HIV/AIDS in the household, disability, and receipt of government benefits (Franchino-Olsen et al., 2024). The high and moderate classes were distinguished beyond their violence patterns by the burden of HIV/AIDS and disability experienced by the adolescents in the class (i.e., classes with moderate to high HIV/AIDS and disability burden vs. classes with low burden, in general). In other words, the LCA produced seven classes that were unique in their combinations of levels of polyvictimization (high; moderate; low) and contextually relevant risk and protective factors (e.g., HIV/AIDS; disability). Though this contextually sensitive polyvictimization model produced insightful findings for the sample and the relevant South African context, this original LCA model did not examine health or well-being outcomes of adolescents beyond variables included in the creation of the 7-class model, such as violence experiences, disability, and substance use.

1.2 Current Study

This paper builds on that LCA model to examine the physical and mental health outcomes associated with the seven polyvictimization classes created in the original LCA model using the Bolck–Croon–Hagenaars (BCH) method. Thus, rather than seeking to isolate the polyvictimization events from the associated risk and protective factors—which were included in the determination of the original groupings to create a contextually sensitive understanding of polyvictimization—these analyses sought to investigate the links between the classes and the health outcomes while also considering the contextual factors (such as poverty, HIV/AIDS, disability burdens) that distinguished the classes. If these health outcomes demonstrated variation across the classes and shifted by level of polyvictimization (high, moderate, low), these differences may broaden our understanding of how adolescent health is linked to patterns of polyvictimization while grounded in contextual risk and protective factors in South African communities.

Figure 1 visualizes the latent classes—reflecting patterns of violence and contextual factors—of the original LCA model and the associations examined via the BCH method. In Fig. 1, Step 1 represents the estimation of the latent classes using the seven types of violence assessed for the sample along with included relevant risk and protective factors. LCA is a valuable person-centered method that investigates heterogeneous subgroups within a sample and allows for a nuanced examination of diverse violence patterns (e.g., polyvictimization; Davis et al., 2019). The diagnostic criteria and model fit indices (available in Online Resource 1) supported a 7-class

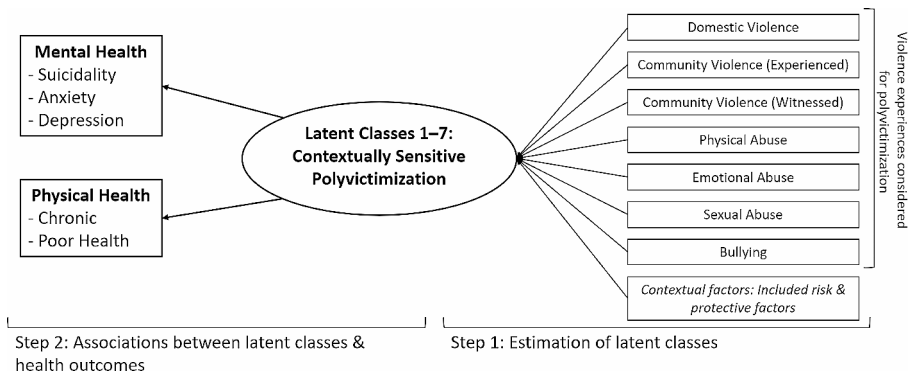


Fig. 1 Latent classes and hypothesized outcome relationships

model solution. These Step 1 findings from the original LCA model are summarized in the Results, and model selection and findings are explored in greater depth in the publication for this original analysis (Franchino-Olsen et al., 2024). Step 2 represents the unique contribution of this manuscript, which examines the associations between these seven contextually sensitive polyvictimization latent classes of the original LCA model and the mental and physical health outcomes for the sampled adolescents. The primary rationale of this subsequent Step 2 analysis is to explore how these contextually sensitive polyvictimization profiles created in Step 1 are potentially linked to broader adolescent health outcomes, thus bridging violence victimization experiences created via person-centered analyses with mental and physical health outcomes. Based on this, the following research questions and hypotheses guided the analyses:

- (1) For adolescents in the sample, what associations exist between the seven classes and their physical health indicators (chronic health issues; recent poor health)?

Hypothesis 1.1: Adolescents in the high polyvictimization classes will have greater odds of a poor physical health indicator than adolescents in the moderate polyvictimization classes who will have greater odds of a poor physical health indicator than those in the low polyvictimization class.

Hypothesis 1.2: Among the high and moderate polyvictimization classes, adolescents in classes with a larger HIV/AIDS and disability burden will have greater odds of a poor physical health indicator than those in their paired class with a lower HIV/AIDS and disability burden.

- (2) For adolescents in the sample, what associations exist between the seven classes and their mental health indicators (depression; anxiety; suicidality)?

Hypothesis 2.1: Adolescents in the high polyvictimization classes will have greater odds of a poor mental health indicator (suicidality) or will have a worse mental health score (depression; anxiety) than adolescents in the moderate polyvictimization classes who will have greater odds of a poor mental

health indicator or will have a worse mental health score than those in the low polyvictimization class.

Hypothesis 2.2: Among the high and moderate polyvictimization classes, adolescents in classes with a larger HIV/AIDS and disability burden will have greater odds of a poor mental health indicator (suicidality) or will have a worse mental health score (depression; anxiety) than those in their paired class with a low/lower HIV/AIDS and disability burden.

2 Methods

2.1 Sample

The sample used adolescent data from a longitudinal sample of adolescents in South Africa who were sampled to representatively capture a population of vulnerable adolescents from low-resource, low-income communities (*Young Carers* project data; Young Carers, 2023). Participants were recruited at wave 1 in 2010–2011 via door-to-door sampling of randomly selected census enumeration areas drawn from two South African provinces (Western Cape and Mpumalanga). Adolescents (aged 11–17) living in the sampled areas were eligible to participate, and most eligible adolescents who were approached for recruitment subsequently agreed to participate (>97.5%; $n_{\text{wave1}}=3515$). Approximately one year later (2011–2012), participants were invited to participate in wave 2 ($n_{\text{wave2}}=3401$; 96.8% retention). At each wave, participants were interviewed using a questionnaire with validated scales about their experiences of violence, health, home, school, and community by trained local interviewers in their home language (XiTsonga, SiSwati, SiPedi, or isiXhosa). At wave 2, most participants (95.68%; $n=3254$) were enrolled in school (grades: 1–12; average grade enrolled: 7.7; 4.32% ($n=147$) had dropped out). In-depth information on the recruitment, consent, and interview procedures has been published previously (Meinck et al., 2016, 2017) and more information on the scales and items included in the questionnaire are available in Online Resource 2.

These analyses build on previous work which examined LCA polyvictimization classes, alongside non-demographic risk and protective factors among the sample. (For these results and additional discussion around measures and analyses, see Franchino-Olsen et al. (2024). Violence victimizations, which composed profiles of polyvictimization, were captured via composite variables representing victimization experiences reported at wave 1 and/or wave 2. Thus, the experiences captured in the original LCA model represent life experiences that occurred in wave 1, wave 2, or both waves of data, and though the sample from which this data is drawn is longitudinal, the data used for these analyses are cross-sectional in nature and represent a composite of violence, risk, and protective measures in an adolescent's life at or before wave 2 recruitment. This was done to best capture the diversity of violence experiences available across the two waves, as violence can shift—taking other forms or changing frequency—as children move through adolescence; thus, the composite measure sought to assess all the forms of violence reported by the adolescent in both

waves of the survey. All outcome measures for this paper (physical health; mental health) were drawn from wave 2 data.

2.2 Measures

All variables used for the included independent and outcome measures had acceptably low levels of missingness (item non-response: 0–3.7%). A full report of the item missingness by measure is available in Online Resource 3.

2.2.1 Violence Victimization, Risk Factors, and Protective Factors

Polyvictimization was conceptualized as having experienced multiple forms of violence (e.g., multiple forms of abuse) potentially across multiple domains (e.g., home/family, community, peer/school). Polyvictimization was represented by seven binary measures for violence victimization across an adolescent's household, family, peers, and community (see Fig. 1): exposed to domestic violence (any in past week), experienced community violence (robbed or physically assaulted in past year), witnessed community violence (witnessed shooting or stabbing), experienced physical abuse (past year), experienced emotional abuse (monthly over past year), experienced sexual abuse (lifetime), and experienced bullying (frequent recurrence in past year; ≥ 3 bullying items occurring 2–3 times or at least one bullying item occurring ≥ 4 times). To generate latent classes that reflected contextually sensitive polyvictimization profiles, contextual risk and protective factors were also included in the original analysis alongside these seven violence victimization measures. Risk factors were captured with demographic and household measures to reflect the setting in which the participant lived (urban/rural), household poverty (hunger due to food insecurity; inability to afford >3 of 8 listed household necessities (e.g., three meals per day, toiletries, clothes, medical care)), caregiver health (AIDS-sick caregiver; caregiver with a disability), adolescent disability, experiences of HIV-related stigma, school attendance, and substance use. Protective factors included receipt of the government-provided child grant available in 2010–2012, receipt of a free school meal, and receipt of free schooling. These government-provided benefits are a post-apartheid era attempt to mitigate harm and reduce inequality. Provided via South Africa's social protection programming, free schooling (no-fee schooling) and free (no cost) school meals were available at the time of wave 1/wave 2 sampling to children who lived in communities that ranked in the bottom three quintiles (poorest 60%) of South African communities. Free school meals were also available to needy learners from the top two quintile communities (Munje & Jita, 2019). More information on these violence measures, risk factors, and protective and associated coding decisions can be found in Franchino-Olsen et al. (2024). Measures employed standardized scales, were previously shown to be valid and acceptable in South Africa, and were demonstrated to be reasonably reliable in this sample ($\alpha > 0.8$; Boyes et al., 2013, 2014, 2020; Boyes & Cluver, 2013, 2015; Meinck et al., 2019). More information on measures used in the analysis can be found in Online Resource 2. All violence victimization, risk factor, and protective factor measures were included as individual binary measures in the creation of the original LCA (7-class) model.

2.2.2 Health Outcomes

Physical and mental health outcomes were assessed at wave 2. Physical health outcomes were two binary measures reflecting any chronic health condition(s) and recent poor health, and individual survey items were drawn from the South African Demographic and Health Survey (Department of Health & Medical Research Council, 2007). The chronic health condition measure captured if the participant reported having asthma, epilepsy, and/or diabetes. The recent poor health measure captured if the participant had been unwell in the past month with cold/flu, general body pains (headaches, backaches, etc.), worms, or skin conditions (rash, white itchy skin, etc.) and/or if the participant had been unwell in the past six months with pneumonia or bronchitis, vomiting or diarrhea, or any injury/burn. Mental health outcomes were captured via a binary measure for suicidality and two score measures for depression and anxiety. Suicidality reflected any suicide ideation in the past month (5 items: wished dead; want to harm self; thought about suicide; planned means for suicide; attempted suicide) drawn from the Mini-International Psychiatric Interview for Children and Adolescents suicidality and self-harm scale (Sheehan et al., 1997). Depression was assessed using the Child Depression Inventory (short form; 10 items; Kovacs, 1992) where each of the ten items were assigned a score of 0/1/2 representing severity of endorsement within an item. Previous work with this depression measure in South Africa established a threshold of ≥ 3 as a threshold for symptomology consistent with a positive screen for depression (Roberts et al., 2022; Steventon Roberts et al., 2022). Anxiety was assessed using the Children's Manifest Anxiety Scale—Revised (14 items; Reynolds, 1980) with individual scale items coded as binary variables (0/1). Previous work with this anxiety measure in South Africa established a threshold of ≥ 10 as a threshold for symptomology consistent with a positive screen for anxiety (Roberts et al., 2022; Steventon Roberts et al., 2022). Mental health outcomes employed standardized scales, were previously shown to be valid and acceptable in South Africa (Online Resource 2), and were demonstrated to be adequately reliable in this sample ($\alpha > 0.7$; Boyes et al., 2013, 2014, 2020; Boyes & Cluver, 2013, 2015; Meinck et al., 2019).

2.3 Analysis

Original analyses (available at Franchino-Olsen et al. (2024)) employed LCA to determine the number and nature of heterogeneous subgroups in the adolescent sample based on violence victimization experiences as well as risk and protective factors. LCA is a person-centered method that allows for observation of underlying data patterns (e.g., violence and relevant risk and protective variables) without requiring pre-determined categories before analysis. Original analyses investigated patterns of polyvictimization experiences alongside relevant contextual risk and protective factors patterns using a 7-class model solution, which was determined to be ideal via model fit statistics (Online Resource 1). Fit statistics included Bayesian Information Criteria (BIC), sample-size adjusted BIC, Akaike Information Criteria (AIC), Vuong-Lo-Mendell-Rubin likelihood ratio test (VLMR LRT) value, and entropy. Lower BIC/AIC values reflect better model fit of the current model (k) to the previ-

ously less complex model ($k-1$). A VLMR LRT that produces a significant p -value demonstrates that the current model fit (k) has improved compared to $k-1$. Entropy can range from 0–1 wherein 1 reflects perfect class separation; values of entropy greater than 0.8 are viewed as acceptable (Celeux & Soromenho, 1996; Ford et al., 2013; Weller et al., 2020).

The original analyses allowed the authors to explore the complex patterns and provide contextual interpretation of model results in the previous publication (Franchino-Olsen et al., 2024). In line with the research questions for this manuscript, analyses here extended the LCA methods used to investigate the physical and mental health outcomes associated with the seven classes of the original model by employing the LCA BCH method. The BCH method allows for consideration of distal outcomes not originally included in construction of the class model. It was used to determine whether the latent classes displayed statistically significant differences in the mean or odds of the selected outcome variables (physical and mental health measures; Nylund-Gibson & Choi, 2018; Nylund-Gibson et al., 2019; Vermunt & Magidson, 2021). The BCH procedure holds the latent classes fixed while accounting for classification error before subsequently including the auxiliary variable of interest (health outcome) and assessing its relation to the latent classes (Nylund-Gibson & Choi, 2018). Outcomes coded with continuous measures (depression, anxiety) could be executed with a Mplus routine that estimated the BCH weights and the final model in a single step. Binary outcomes (chronic health condition, poor health, suicidality) were estimated using two steps with BCH weights estimated in the first step and incorporated into the second step (Asparouhov & Muthén, 2021). Outcomes were compared across classes using odds ratios (binary measures: chronic health condition, poor health, suicidality) or chi-square values for paired estimates of means (score measures: depression, anxiety). Odds ratio and chi-square results were assessed for significance ($\alpha=0.05$) and meaningful difference. Reported p -values underwent the Benjamini–Hochberg procedure to decrease the false discovery rate (FDR; chosen FDR for procedure=0.05; Haynes, 2013). For odds ratios, a meaningful difference across classes was odds ratios greater than or equal to 1.2 or less than or equal to 0.8 in class comparisons, which represents approximately a 5% difference in probability of the outcome between the compared classes (e.g., $p(\text{Class 1})=0.53$, $p(\text{Class 2})=0.48$; OR Class 1 vs. Class 2=1.22; OR Class 2 vs. Class 1=0.82). For comparison of means, a meaningful difference was assessed as a score difference of greater than or equal to 1, which represents endorsement of one additional scale item (for the anxiety and depression scales), or a one-step increase in severity level within an item (for the depression scale). The employed analyses handle missingness (item non-response) via full information maximum likelihood. All LCA analyses were performed using Mplus version 8 (Muthén & Muthén, 2017).

3 Results

The adolescent sample was composed of 3401 participants. Table 1 presents the descriptive statistics for the sample, which included demographics of age, gender, and setting of their residence, as well as for violence, risk factors, and protective factors

Table 1 Descriptive statistics for eligible adolescent participants (n=3401)

	n (%)
Demographics	
Age (Wave 2)	
<i>Mean (SD)</i>	14.7 (2.2%)
Gender	
<i>Boy</i>	1482 (43.6%)
<i>Girl</i>	1919 (56.4%)
Residence	
<i>Rural</i>	1692 (49.8%)
<i>Urban</i>	1709 (50.2%)
Violence	
Domestic violence exposure	1472 (43.3%)
Community violence	
<i>Experienced</i>	1524 (44.8%)
<i>Witnessed</i>	1359 (40.0%)
Physical abuse	2009 (59.1%)
Emotional abuse	1781 (52.4%)
Sexual abuse	549 (16.1%)
Bullying	2265 (66.6%)
Risk factors	
Poverty	
<i>Hunger</i>	1317 (38.7%)
<i>Necessities</i>	1360 (40.0%)
Informal housing	701 (20.6%)
Caregiver	
<i>AIDS-sick caregiver</i>	1360 (40.0%)
<i>Caregiver disability</i>	742 (21.8%)
Disability	1124 (33.1%)
HIV-related stigma	1472 (43.3%)
School missed	824 (24.2%)
Substance use	985 (29.0%)
Protective factors	
Child grant	2141 (63.0%)
School meal	3045 (89.5%)
Free school	2242 (65.9%)
Physical health outcomes	
Chronic health condition	167 (4.9%)
Recent poor health	2887 (84.9%)
Mental health outcomes	
Depression score (0–20)	
<i>Score range</i>	0–16
<i>Mean (SD)</i>	1.4 (2.2)
Anxiety (0–14)	
<i>Score range</i>	0–14
<i>Mean (SD)</i>	3.6 (3.2)
Suicidality	645 (19.0%)

n count, SD standard deviation

included in the construction of the LCA classes and the physical and mental health outcomes assessed using the BCH method. Participants had a mean age of 14.7 years, and the sample had slightly more girls (56.4%) than boys and an even split between rural (49.8%) and urban residence settings. The prevalence of reported experiences of violence ranged from 16.1% for sexual abuse to 66.6% for bullying. Participants reported experiences that reflected a high burden of poverty (38.7% reported frequent hunger due to food insecurity; 40.0% reported being unable to afford four or more of the eight basic household items assessed in the survey) and housing insecurity (informal housing: 20.6%). Approximately four in ten adolescents reported having an AIDS-sick caregiver (40.0%) or experiencing HIV-related stigma themselves (43.3%). Receipt of free school meals was high (89.5%), while approximately two in three adolescents received the child grant (63.0%) and free schooling (65.9%). Few adolescents reported having a chronic health condition (4.9%), but a high majority of the sample had been ill or in poor health in the previous six months (84.9%). The depression score (potential range: 0–20) had a mean of 1.4 and a range from 0–16. The anxiety score (potential range: 0–14) had a mean of 3.6 and a range of 0–14. Just under one in five of the participants reported a history of suicidality (19.0%).

Comparative fit statistics for 1–8 classes used for model selection in previous LCA analysis (excluding physical and mental health outcomes) are available in Franchino-Olsen et al. (2024) and Online Resource 1. As explored in the previous work, the minimum AIC and BIC values for a model with a significant VLMR LRT occurred in a 7-class model where the smallest class size (8.0%) and entropy (0.807) were acceptable. Though not used for class selection, the AIC and BIC values for the health outcomes examined here are listed in the footnotes of the tables with the results of the BCH models.

Additionally, the latent class likelihood proportion for the 7-class model published previously (i.e., Step 1 in Fig. 1) are shown in Fig. 2 and in Online Resource 4. An in-depth discussion of these class results, including their demographic composition, can be found in Franchino-Olsen et al. (2024). Broadly, the 7-class model divided adolescent participants into classes displaying three approximate levels of polyvictimization: high, moderate, and low polyvictimization experiences; these polyvictimization levels were distinguished among the classes further by contextual risk and protective factors. (Generally, violence within a class was classified by likelihood values: low when <0.33 , moderate when $0.33\text{--}0.67$, and high when >0.67 . High polyvictimization classes had three or more violence types with high likelihood and no more than two with low likelihood; moderate polyvictimization classes had four or five violence types with moderate or high likelihood; and low polyvictimization classes had four or more violence types with low likelihood.) Additionally, among the high and moderate polyvictimization classes, participants were further divided by their reported burdens of HIV/AIDS (caregiver HIV/AIDS; stigma experiences) and disability. Two high polyvictimization classes (Class 1; Class 2) existed in the 7-class model and were composed of participants from both urban and rural settings. Class 1 participants had a high likelihood of having an AIDS-sick caregiver and experiencing HIV-related stigma and of having a caregiver with a disability or a disability themselves while their peers in the Class 2 high polyvictimization class had a low likelihood of these burdens. Four moderate polyvictimization classes (Class 3–6) emerged with

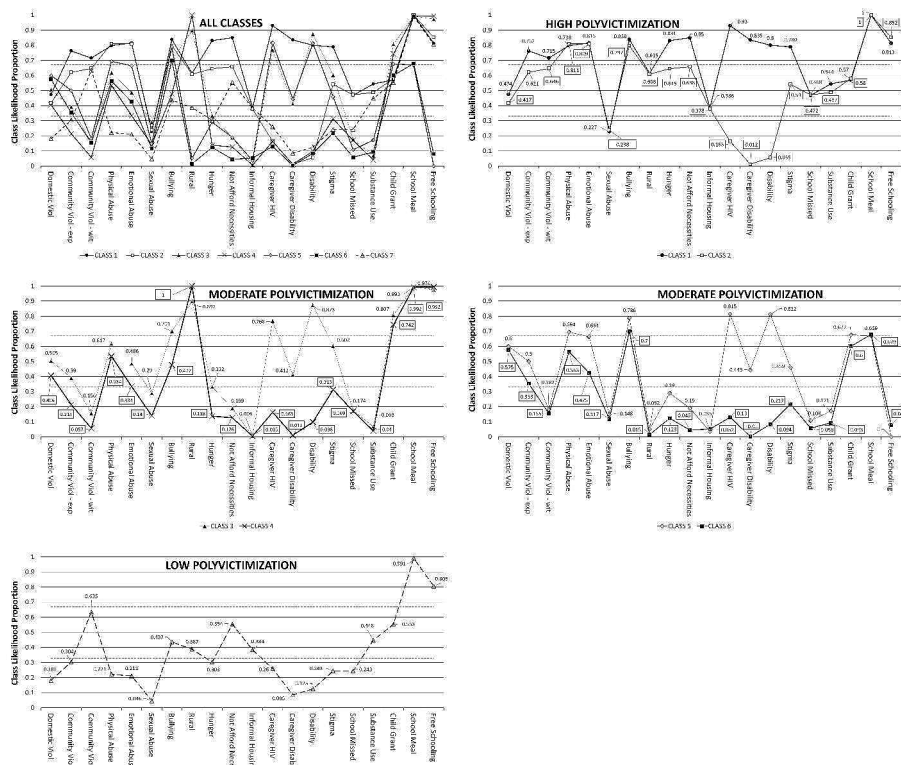


Fig. 2 Latent class likelihood proportions for the 7-class model for polyvictimization (PV), risk factors, and protective factors. Original LCA analysis published in Franchino-Olsen et al. (2024); Results available as a table in Online Resource 4. **Top row, left:** All classes, **Top row, right:** High PV (Class 1 & 2). **Middle row, left:** Moderate PV, Rural settings, **Middle row, right:** Moderate PV, Urban settings. (Class 3 & 4), (Class 5 & 6). **Bottom row, left:** Low PV (Class 7). Data values represent class likelihood proportions for each variable (0.0–1.0); Dashed vertical lines at 0.33 and 0.67 approximately divide the values into Low likelihood (<0.33); Moderate likelihood (0.33–0.67); High likelihood (>0.67)

two classes (Class 3; Class 4) composed of participants from a rural setting and the other two classes (Class 5; Class 6) composed of participants from an urban setting. Alongside the moderate polyvictimization experiences likely in these classes, Class 3 and Class 5 participants had a moderate to high likelihood of having an HIV/AIDS burden (AIDS-sick caregiver; HIV-related stigma) and a disability burden (caregiver with disability; adolescent with disability). Their peers in Class 4 and Class 6 experienced moderate polyvictimization but with a low likelihood of this HIV/AIDS and disability burden. Finally, Class 7 was composed of participants with a low likelihood of experiencing polyvictimization—despite living in communities where violence is present (moderate likelihood of exposure to community violence)—and a low likelihood of experiencing the measured burdens of HIV/AIDS and/or disability. A brief descriptive summary of each of the seven classes and their broad violence and contextual characteristics is provided for reference (Table 2).

Table 2 Descriptive summary for each of the classes and their broad characteristics

Violence		Contextual factors		
		Setting & Poverty	HIV/AIDS	Disability
Class 1 n=486 (14%)¹	High polyvictimization— High ² community violence; physical abuse; emotional abuse; bullying Moderate ² domestic violence Above average sexual abuse	Mix of urban & rural High poverty (hunger & necessities) and above average informal housing	High HIV/AIDS burden	High disability burden
Class 2 n=611 (18%)	High polyvictimization— High physical abuse; emotional abuse; bullying Moderate domestic violence; community violence Above average sexual abuse	Mix of urban & rural Moderate poverty (hunger & necessities) and above average informal housing	Low–Moderate HIV/AIDS burden	Low disability burden
Class 3 n=323 (10%)	Moderate polyvictimization— High bullying Moderate domestic violence; community violence (experienced); physical abuse; emotional abuse Low ² community violence (witnessed) Above average sexual abuse	Primarily rural Low–Moderate poverty (hunger & necessities) and informal housing	Moderate–High HIV/AIDS burden	Moderate–High disability burden
Class 4 n=473 (14%)	Moderate polyvictimization— Moderate domestic violence; physical abuse; emotional abuse; bullying Low community violence Approximately average sexual abuse	Exclusively rural Low poverty (hunger & necessities) and informal housing	Low HIV/AIDS burden	Low disability burden
Class 5 n=271 (8%)	Moderate polyvictimization— High physical abuse; emotional abuse; bullying Moderate domestic violence; community violence (experienced) Low community violence (witnessed) Approximately average sexual abuse	Primarily urban Low poverty (hunger & necessities) and informal housing	Moderate–High HIV/AIDS burden	Moderate–High disability burden

Table 2 (continued)

		Contextual factors		
	Violence	Setting & Poverty	HIV/AIDS	Disability
Class 6 n=623 (18%)	Moderate polyvictimization—			
	High bullying	Primarily urban	Low HIV/AIDS	Low disability
	Moderate domestic violence; community violence (experienced); physical abuse; emotional abuse	Low poverty (hunger & necessities) and informal housing	burden	burden
	Low community violence (witnessed); sexual abuse			
Class 7 n=614 (18%)	Low polyvictimization—			
	Moderate community violence (witnessed); bullying	Mix of urban & rural	Moderate	Low
	Low domestic violence; community violence (experienced); physical abuse; emotional abuse; sexual abuse	Moderate poverty (hunger & necessities) and informal housing	HIV/AIDS burden	disability burden

¹Percentages (%) represent the proportion of the class size relative to the whole sample ($n_{\text{total}}=3401$)

²High, Moderate, and Low designations throughout the table reflect the likelihood proportion (or conditional item probability; Nylund-Gibson & Choi, 2018) of the variable(s) in the latent class model (Fig. 2; Online Resource 4). The likelihood values to which these designations were applied were: High likelihood (>0.67); Moderate likelihood (0.33–0.67); Low likelihood (<0.33)

3.1 Physical Health Outcomes

The BCH model outcomes for the binary physical and mental health outcomes (chronic health condition; poor health; suicidality) are presented in Table 3 as odds ratios (OR) across class comparisons. Odds ratios that reached statistical significance (<0.05) are listed and meaningfully different odds (odds ratio ≥ 1.2 or ≤ 0.8) are distinguished. Notable class comparisons for these binary outcomes that were both statistically significant and meaningfully different and which are highlighted in the subsequent paragraphs are also presented in Fig. 3 as OR for paired classes.

For chronic health conditions, participants in the high polyvictimization classes (Class 1; Class 2) had significantly and meaningfully greater odds of also having a chronic health condition compared to participants in moderate polyvictimization classes without HIV/AIDS and disability burdens (Class 4; Class 6). However, comparisons to moderate polyvictimization classes with HIV/AIDS and disability burdens (Class 3; Class 5) and to the low polyvictimization class (Class 7) were either significantly lower for the high polyvictimization classes or non-significant or not meaningfully different. Despite a low likelihood of having a disability, participants in Class 2 were more likely to have a chronic health condition than their peers with a high likelihood of a disability in Class 1 (Class 1 vs. Class 2 OR: 0.80). Participants who experienced low polyvictimization (Class 7) had significantly and meaningfully greater odds of having a chronic health condition compared to participants in Class 4 and Class 6.

As shown in the descriptive results of Table 1, recent poor health was a common experience (84.9%), but Table 3 odds ratios were able to distinguish differences in

Table 3 Odds ratios for class comparisons of physical health outcomes and suicidality mental health outcome by LCA class

Odds Ratio Class Comparisons						
Physical Health	Class 1 vs. ____	Class 2 vs. ____	Class 3 vs. ____	Class 4 vs. ____	Class 5 vs. ____	Class 6 vs. ____
<i>Chronic</i>	Class 2: 0.80 †	Class 3: n.s	Class 4: n.s	Class 5: 0.32 *	Class 6: 1.56 †	Class 7: 0.65 †
	Class 3: n.s	Class 4: 3.28 *	Class 5: n.s	Class 6: 0.49 *	Class 7: 1.00 †	
	Class 4: 2.63 *	Class 5: 1.03 †	Class 6: n.s	Class 7: 0.32 *		
	Class 5: 0.83 †	Class 6: 1.61 †	Class 7: n.s			
	Class 6: 1.29 †	Class 7: 1.04 †				
<i>Poor Health</i>	Class 2: 0.71 †	Class 3: 1.62 †	Class 4: 1.12 †	Class 5: 0.60 †	Class 6: 1.20 †	Class 7: 1.72 †
	Class 3: 1.15 †	Class 4: 1.82 †	Class 5: 0.67 †	Class 6: 0.72 †	Class 7: 2.07 †	
	Class 4: 1.29 †	Class 5: 1.09 †	Class 6: 0.80 †	Class 7: 1.23 †		
	Class 5: 0.77 †	Class 6: 1.31 †	Class 7: 1.39 †			
	Class 6: 0.92 †	Class 7: 2.26 †				
Mental Health	Class 1 vs. ____	Class 2 vs. ____	Class 3 vs. ____	Class 4 vs. ____	Class 5 vs. ____	Class 6 vs. ____
<i>Suicidality</i>	Class 2: 1.34 †	Class 3: 2.70 †	Class 4: 3.70 *	Class 5: 0.11 †	Class 6: 2.01 †	Class 7: 1.25 †
	Class 3: 3.61 †	Class 4: 10.11 †	Class 5: 0.41 †	Class 6: 0.22 †	Class 7: 2.50 †	
	Class 4: 13.54 †	Class 5: 1.12 †	Class 6: 0.83 †	Class 7: 0.28 *		
	Class 5: 1.50 †	Class 6: 2.25 †	Class 7: 1.04 †			
	Class 6: 3.01 †	Class 7: 2.80 †				
	Class 7: 3.75 †					

*p-value<0.05

†p-value<0.01

bolded text: “meaningful” difference (odds ratio ≥ 1.2 or odds ratio ≤ 0.8)

n.s.: non-significant/odds ratio failed to reach significance (p-value ≥ 0.05)

Model statistics: *Chronic* model—Akaike Information Criteria (AIC): 14,312.538; Bayesian Information Criteria (BIC): 14,392.241; Sample-size adjusted BIC: 14,350.934;*Poor Health* model—Akaike Information Criteria (AIC): 15,874.835; Bayesian Information Criteria (BIC): 15,954.548; Sample-size adjusted BIC: 15,913.241;*Suicidality* model—Akaike Information Criteria (AIC): 16,077.531; Bayesian Information Criteria (BIC): 16,157.237; Sample-size adjusted BIC: 16,115.930

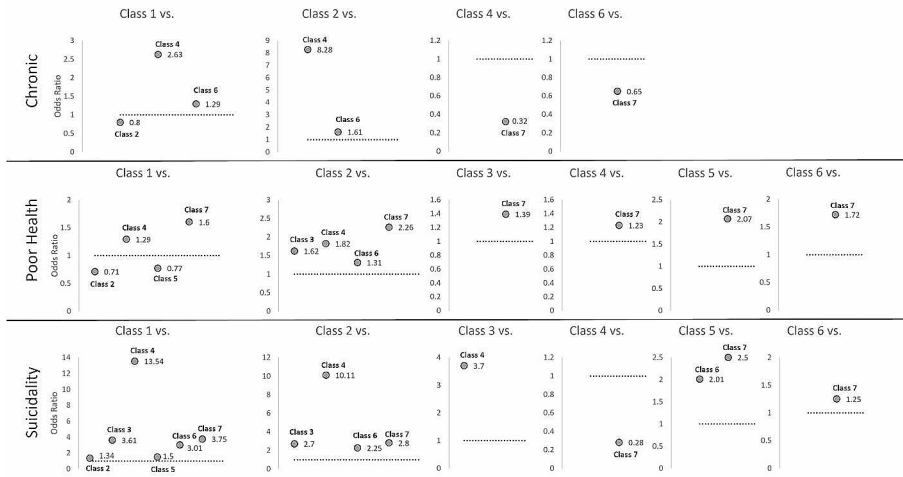


Fig. 3 Odds ratios for select class comparisons of physical health outcomes and suicidality mental health outcome by LCA class. Full odds ratio results (all class comparisons) available in Table 3; dotted line shown at odds ratio=1.0

poor health across the seven classes. In general, participants in the high polyvictimization classes (Class 1; Class 2) had greater odds of poor health compared to the moderate polyvictimization classes and the low polyvictimization class (Class 7). Those in the moderate polyvictimization classes (Class 3–6) had significantly and meaningfully greater odds of poor health than those in the low polyvictimization class. Despite having the additional burden of HIV/AIDS and disability, adolescents in Class 1 had lower odds of poor health compared to their high polyvictimization peers in Class 2 (Class 1 vs. Class 2 OR: 0.71). Class 1 had lower odds of poor health compared to Class 5 (moderate polyvictimization class with HIV/AIDS and disability burden; Class 1 vs. Class 5 OR: 0.77), and comparisons across Class 1 to Class 3, Class 1 to Class 6, and Class 2 to Class 5 were not meaningfully different.

3.2 Mental Health Outcomes

Participants in the high polyvictimization classes (Class 1; Class 2) had greater odds of reporting a history of suicidality (Table 3) with the participants carrying the additional burdens of HIV/AIDS and disability (Class 1) having the highest odds of suicidality (e.g., Class 1 vs. Class 2 OR: 1.34). In the moderate polyvictimization classes, rural participants with HIV/AIDS and disability burdens (Class 3) had greater odds of suicidality than their rural peers with moderate polyvictimization but low HIV/AIDS and disability burdens (Class 3 vs. Class 4 OR: 3.70). Urban participants with moderate polyvictimization and HIV/AIDS and disability burdens (Class 5) had greater odds of suicidality than their equivalent urban peers without these burdens (Class 5 vs. Class 6 OR: 2.01). With the exception of class 4, all other classes had significantly greater odds of suicidality than participants in the low polyvictimization class (Class

7), though the comparison between Class 3 to Class 7 (OR: 1.04) was too small to be meaningfully different.

The mean estimates and standard errors for the scored mental health outcomes (depression; anxiety) are presented in Table 4. Chi-square values for paired comparisons between classes were calculated, and those that reached statistical significance (<0.05) are listed. As stated previously, estimates were determined to be meaningfully different if the difference between a pair of class score estimates was greater than or equal to 1, representing one additional item endorsed on the scale (anxiety: scored 0/1; depression: scored 0/1/2) or a one-step increase in an item's severity on the scale (depression).

Participants in the high polyvictimization classes (Class 1; Class 2) had the greatest estimates for the depression score compared to the moderate and low polyvictimization classes, though Class 2 was not meaningfully different from those in the low polyvictimization class (Class 7). Those with HIV/AIDS and disability burdens (Class 1) had a significant but not a meaningfully higher depression score than their

Table 4 Mean score estimates and class comparisons of scored mental health outcomes by LCA class

Mental Health Scores	Mean Estimate (SE)	Significance of Estimate Comparisons across Classes					
		Class 1 vs. _____	Class 2 vs. _____	Class 3 vs. _____	Class 4 vs. _____	Class 5 vs. _____	Class 6 vs. _____
<i>Depression</i>	Class 1: 2.88 (0.14)	Class 2: *	Class 3: †	Class 4: †	Class 5: †	Class 6: *	Class 7: †
	Class 2: 2.43 (0.13)	Class 3: †	Class 4: †	Class 5: n.s	Class 6: †	Class 7: †	
	Class 3: 0.57 (0.94)	Class 4: †	Class 5: †	Class 6: n.s	Class 7: †		
	Class 4: 0.18 (0.06)	Class 5: †	Class 6: †	Class 7: †			
	Class 5: 0.85 (0.11)	Class 6: †	Class 7: †				
	Class 6: 0.53 (0.06)	Class 7: †					
	Class 7: 1.54 (0.11)						
<i>Anxiety</i>	Class 1: 5.10 (0.18)	Class 2: n.s	Class 3: †	Class 4: †	Class 5: †	Class 6: †	Class 7: n.s
	Class 2: 4.71 (0.17)	Class 3: †	Class 4: †	Class 5: †	Class 6: †	Class 7: †	
	Class 3: 3.43 (0.22)	Class 4: †	Class 5: n.s	Class 6: n.s	Class 7: †		
	Class 4: 2.22 (0.14)	Class 5: *	Class 6: †	Class 7: *			
	Class 5: 4.35 (0.24)	Class 6: †	Class 7: †				
	Class 6: 3.06 (0.14)	Class 7: †					
	Class 7: 2.77 (0.14)						

SE standard error

Chi-square value for paired estimate comparisons between classes: *p-value <0.05 ; †p-value <0.01

bolded text: “meaningful” difference (Mean estimates difference $\geq \pm 1$, representing 1 additional item endorsed on the scale (depression; anxiety) or greater severity within a scale item (depression))

n.s. non-significant/chi-square p-value failed to reach significance (p-value ≥ 0.05)

Model statistics: *Depression* and *Anxiety* models—Akaike Information Criteria (AIC): 75,230.448; Bayesian Information Criteria (BIC): 76,125.694; Sample-size adjusted BIC: 75,661.784

high polyvictimization peers (Class 2). Among the participants in moderate polyvictimization classes, those from urban areas with HIV/AIDS and disability burdens (Class 5) had the highest depression score, followed by those from rural areas with HIV/AIDS and disability burdens (Class 3), those from urban areas (Class 6), and then those from rural areas (Class 4). However, among the moderate polyvictimization classes, depression score mean estimates ranged from 0.18–0.85 and thus were not meaningfully different. The low polyvictimization class (Class 7) had a significantly and meaningfully higher depression score than moderate polyvictimization classes without HIV/AIDS and disability burdens (Class 4; Class 6).

Broadly, participants who had experienced high polyvictimization (Class 1; Class 2) had the highest anxiety scores compared to the moderate and low polyvictimization classes, though the differences between Class 1 and Class 2 scores and Class 2 and Class 5 scores failed to reach significance and Class 1 and Class 5 scores were not meaningfully different. Participants from moderate polyvictimization classes had the highest anxiety score when from the urban class with HIV/AIDS and disability burdens (Class 5), followed by those from the rural class with HIV/AIDS and disability burdens (Class 3), then those from urban areas (Class 6) and those from rural areas (Class 4) who had the lowest anxiety scores of the sample. The difference in scores between Class 3 and Class 6 failed to reach significance, and scores were too close within half the moderate polyvictimization class comparisons to be meaningfully different. Participants in the low polyvictimization class (Class 7) had significantly—but not meaningfully—higher anxiety scores than Class 4, though the scores were significantly and meaningfully lower in Class 7 than in the urban moderate polyvictimization class with HIV/AIDS and disability burden (Class 5).

4 Discussion

This study presents the findings from analyses investigating the associations between a 7-class LCA model characterizing contextually sensitive polyvictimization class profiles and physical and mental health outcomes for adolescent participants sampled from low-resource South African communities using the BCH method. Physical health models examined the associations for chronic health conditions and recent poor health, and other health factors, such as whether the adolescent had a disability, had a caregiver with HIV/AIDS or experienced stigma, or experienced hunger due to food insecurity, were accounted for in the LCA model as relevant risk factors for polyvictimization. For mental health, the models examined the links between the classes and suicidality history and scores for depression and anxiety.

Hypothesis 1.1 predicted that the high polyvictimization classes (Classes 1 and 2) would have the greatest odds of poor physical health indicators, followed by the moderate polyvictimization classes (Classes 3–6), and then the low polyvictimization class (Class 7). Hypothesis 1.2 predicted that within the high and moderate classes, those with the greater HIV/AIDS and disability burdens (Class 1; Class 3; Class 5), would have the greater odds of poor physical health indicators compared to their paired class without the HIV/AIDS and disability burdens (Class 2; Class 4; Class 6). These hypotheses were partially supported. The high polyvictimization classes

(Classes 1 and 2) had significantly and meaningfully higher odds of having a chronic health condition compared to the moderate polyvictimization classes without an HIV/AIDS and disability burden (Class 4; Class 6) and had significantly and meaningfully greater odds of having recent poor health compared to the rural polyvictimization class without an HIV/AIDS and disability burden (Class 4). In line with hypothesis 1.1, the low polyvictimization class (Class 7) had the lowest odds of recent poor health compared to the other six classes, but this was not the case for having a chronic health condition. Contrary to hypothesis 1.2, the high polyvictimization class without an HIV/AIDS and disability burden (Class 2) had greater odds of having either poor physical health indicator than its paired high polyvictimization class with the HIV/AIDS and disability burden (Class 1). Within the moderate polyvictimization classes, hypothesis 1.2 was supported in the pair comparison between urban classes (Class 5 vs. Class 6) but not rural classes (Class 3 vs. Class 4) for both poor physical health indicators.

Hypothesis 2.1 predicted worse mental health outcomes for high compared to moderate compared to low polyvictimization classes, and hypothesis 2.2 predicted that within the paired classes for high and moderate polyvictimization—distinguished by HIV/AIDS and disability burdens—those with the additional HIV/AIDS and disability experiences would have worse mental health outcomes. These hypotheses were partially supported. The high polyvictimization class with HIV/AIDS and disability burden (Class 1) had greater odds of suicidality and the highest mean estimate for depression and anxiety scores, though some of the paired score comparisons were not meaningfully or significantly different. The low polyvictimization class (Class 7) had lowest odds of suicidality in all its paired class comparisons except for when compared to adolescents from rural areas with moderate polyvictimization and without HIV/AIDS and disability burdens (Class 4). Some, but not all, of the paired comparisons within the moderate polyvictimization classes were meaningfully distinct for the depression and anxiety scores.

In general, the results demonstrated that the high polyvictimization classes were relevant and were significantly and meaningfully associated with worse physical and mental health outcomes. This builds on prior research with South African children showing that polyvictimization, particularly high polyvictimization, is associated with poor or risky health behaviors (substance use; risky sexual behaviors; Leoschut & Kafaar, 2017). Similarly, previous research has demonstrated that American adolescents with a profile of high polyvictimization exposure have worse clinical outcomes, including symptoms of PTSD and suicidality, compared to their peers with low polyvictimization exposure (Adams et al., 2016). Among justice-involved American youth, those within a polyvictimization latent class were similarly found to have more severe PTSD symptoms and internalizing behaviors, including depression, anxiety, and suicidality, which Charak et al. (2019) attributed to growing up in a state of survival-based dysregulation by frequent and/or multi-context violence in childhood and adolescence. Similar to work conducted by Dierkhising et al. (2019), these findings may be understood via a developmental trauma formulation wherein internalizing behaviors are due to the developmental timing in which they experienced polyvictimization or the cumulative impact of polyvictimization across young childhood and adolescence, though more research in these settings would be required

to investigate the links between the timing and onset (trajectory) of polyvictimization events and internalizing behavior outcomes. South African adolescents experiencing high polyvictimization may be characterized by a similar state of survival-based dysregulation, which means their unmet health needs include support required to recover from violence and to recover from the adverse social learning they may have picked up by experiencing violence from caregivers, siblings, peers, teachers, and community members (Charak et al., 2019).

In this study, for many of the health outcomes within the moderate and high polyvictimization classes, those adolescents more likely to carry an HIV/AIDS and disability burden had meaningfully worse health outcomes than their peers in the comparable class without this additional burden. However, as indicated by the partially supported hypotheses, the results present some unexpected complexity particularly within the moderate and low polyvictimization classes, as not all health indicators were better for the low polyvictimization class nor for those without HIV/AIDS and disability burdens in the moderate polyvictimization classes. The contradictions of the findings to the stated hypotheses are somewhat similar to work done with “at-risk” American youth by Kretschmar et al. (2017) where those in the low victimization class were more likely to have a primary anxiety disorder compared to those in the high violence exposure class, and the difference in likelihood of a mood disorder (e.g., depression) diagnosis between the low and high classes was not notably large (approximately 5%). More research is likely needed to try to untangle the drivers of these unexpected associations within the moderate and low polyvictimization classes, though the general pattern (despite these unexpected associations) across these classes provides meaningful findings that can be applied in the interim. Overall, the findings of this study seem to indicate that that experiences of high polyvictimization are consistently linked to worse health outcomes for South African adolescents from low-resource communities, demonstrating the relevance of examining polyvictimization in these contexts as a factor influencing health and well-being. These findings support the work of Sui et al. (2021) with South African adolescents wherein the cumulative impact of violence across multiple domains/contexts via polyvictimization led to cumulatively worse levels of anxiety, depression, stress, and suicidality. This points to a need to better identify and address the health needs of these adolescents with high polyvictimization experiences, as they are not only experiencing violence in many forms and across many contexts, but their physical and mental health is poor and requires appropriate healthcare.

4.1 Limitations

A key limitation to this study is around what these findings do not show. The analyses used do not demonstrate a causal path between polyvictimization experiences and these health outcomes. Instead, by considering polyvictimization alongside risk and protective factors in the determination of the class, they show the links between the profile of each class and the health status for those within each class. Thus, the analyses situate polyvictimization within the context of risk and protective factors in which the participants experience violence and show how these profiles are associated with physical and mental health outcomes. This means the analyses consider a

more holistic (i.e., contextually sensitive) profile of participants than methods isolating polyvictimization events alone, which may mean the findings are relevant to screening for and response to polyvictimization in these contexts, as they provide nuance around nature of polyvictimization in the lives of adolescents and how it may be considered among health risks and other potential upstream factors impacting adolescent health. The gender diversity of the sample was limited to boys and girls, as identities outside this binary were not assessed in the surveys. The original 7-class LCA model on which these BCH results were built to explore the links between the original classes and health outcomes did not include gender in the LCA model, as gender contributed limited univariate entropy in the preliminary LCA models and did not vary meaningfully across the classes. As result of this exclusion in the original model, gender is also not factor considered in this analysis. The adolescent participants were sampled from two regions in South Africa over a decade ago, limiting the results of these findings beyond those settings and that timeframe. However, the sample benefited from random sampling and low refusal rates among eligible participants, so these results are likely representative of adolescents in disadvantaged areas in 2010–2012 in those regions of South Africa. As the regions were selected to capture highly deprived South African communities in which many adolescents grew up, the results may offer potential insights to other low-resource, including rural, communities in South Africa or other contexts in southern Africa, which are often overlooked and understudied in many research samples. The government-provided social protections in South Africa have expanded since 2012 and currently offer more benefits to a greater number of vulnerable populations than was available at the time of data collection. However, the significant health and economic burdens of the past few years (e.g., Covid-19 pandemic, energy crisis, increased cost of living) may have increased the strain on the average South African household in these communities and impacted the prevalence of violence, polyvictimization, and physical and mental health conditions for adolescents in highly deprived South African settings. More research into the connections between polyvictimization and health for vulnerable South African adolescents is needed.

4.2 Implications and Conclusion

These findings provide evidence of a link between high polyvictimization and poor physical and mental health outcomes for South African adolescents and have several implications for future research, practice, and policy. Given the normative acceptance and justification of many forms of violence in South Africa, experiences of high polyvictimization (represented by approximately 32% of this sample) are likely experienced by large portion of adolescents in these and similar contexts (Hoosen et al., 2022). Future research should investigate further into the polyvictimization circumstances, risk factors, and health effects for adolescents in South Africa, including seeking to model the potentially causal pathways between polyvictimization and health outcomes and the impact of the timing and onset (trajectory) of polyvictimization patterns and health outcomes. Practice and programming adjustments should be made to incorporate considerations of violence—particularly the cumulative burden of violence as captured via polyvictimization—in health screenings, deliv-

ery of health care, and health programming. All these practice and programming elements should seek to target the causes of adolescent poor health, which seems to include high burdens of violence via polyvictimization experiences. In areas in which urgent intervention can be done and is needed (e.g., adolescent suicidality), adding polyvictimization as a risk factor for poor health seems relevant and pressing. Policy decisions should seek to provide greater protections and social supports to prevent and respond to violence that occurs in many contexts for children and adolescents (home, school, community, etc.), seeking to remove the strain of poverty, HIV/AIDS, and disability experienced by adolescents and their households as well as seeking to counter the normative acceptance of violence as a means of discipline (home, school) or an acceptable aspect of partnered relationships. The findings also highlight the need for programming and policy to address the context-specific gaps around trauma-informed health care provision and the limited availability of mental health and parenting supports in these communities. Considerations for violence experiences, including polyvictimization, could be incorporated into existing evidence-based interventions targeting health care, mental health, positive parenting, and other relevant risks and outcomes. However, many of these trauma-informed and evidence-based programs or policies are not widely available in these low-resource South African communities despite the prevalent violence and abuse and high health burdens shouldered by adolescents and others in the community. Considerations of resource allocation in policy and programming decisions must account for ensuring that violence prevention and intervention efforts reach rural communities and that the health infrastructure in these areas is able to adequately serve the complex violence and health needs of rural and vulnerable adolescents. These pressing needs likely require a cohesive and holistic approach to respond to the broad range of childhood violence experiences in a coordinated manner while also attending to the trauma and poor health outcomes associated with a diversity of violence experiences. Research, programming, and policy may benefit from the accelerator framework used to understand violence prevention in South Africa, as it offers a method to assess multiple forms of violence and relevant health outcomes while aiming to identify prevention efforts with a broad impact (Cluver et al., 2020). Overall, any practice, programming, or policy response to adolescent health and/or violence needs to consider the complex role that violence, particularly polyvictimization, has in the lives of adolescents and the burdens and health challenges they carry while also seeking to cope and live with these cumulative victimizations.

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Declarations

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