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► **To cite this version:**

Lesley Andres, Wolfgang Lauterbach, Janine Jongbloed, Hartwig Hümme. Gender, education, and labour market participation across the life course. *International Journal of Lifelong Education*, 2021, 40 (2), pp.170-189. <10.1080/02601370.2021.1924302>. <hal-04532559>

HAL Id: hal-04532559

<https://hal.science/hal-04532559v1>

Submitted on 4 Apr 2024

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Gender, education, and labour market participation across the life course:

A Canada/Germany comparison

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In this paper, we employ a comparative life course approach for Canada and Germany to unravel the relationships among general and vocational educational attainment and different life course activities, with a focus on labour market and income inequality by gender. Life course theory and related concepts of ‘time,’ ‘normative patterns,’ ‘order and disorder,’ and ‘discontinuities’ are used to inform the analyses. Data from the *Paths on Life’s Way (Paths)* project in British Columbia, Canada and the German *Pathways from Late Childhood to Adulthood (LifE)* which span 28 and 33 years, respectively, are employed to examine life trajectories from leaving school to around age 45. Sequence analysis and cluster analyses portray both within and between country differences – and in particular gender differences – in educational attainment, employment, and other activities across the life course which has an impact on ultimate labour market participation and income levels. ‘Normative’ life courses that follow a traditional order correspond with higher levels of full-time work and higher incomes; in Germany more so than Canada, these clusters are male dominated. Clusters characterized by ‘disordered’ and ‘discontinuous’ life courses in both countries are female dominated and associated with lower income levels.

Keywords: comparative life course trajectories; education; gender; work; income; labour market inequality

The Version of Record of this manuscript was published online: 10 May 2021 and is available in the *International Journal of Lifelong Education* at <https://www.tandfonline.com/doi/full/10.1080/02601370.2021.1924302>

To cite this article:

Lesley Andres, Wolfgang Lauterbach, Janine Jongbloed & Hartwig Hümmel (2021) Gender, education, and labour market participation across the life course: A Canada/Germany comparison, *International Journal of Lifelong Education*, 40:2, 170-189, DOI: 10.1080/02601370.2021.1924302

Introduction

Education plays an important role in shaping labour market entry and has a lasting impact on employment biographies and life chances over the life course. In the international policy community, there is a growing awareness that rising labour market and income inequality are major risks to our future prosperity and security (Stiglitz, 2012, OECD, 2015a, Green *et al.*, 2016, Brown, 2017). Cross-national studies demonstrate that the ways in which educational systems promote successful labour market entry and longevity differ by country (van de Werfhorst, 2011, Brzinsky-Fay and Solga, 2016). A key way in which educational systems differ is their focus on vocational versus general education programs at both the secondary and tertiary levels. While vocationally orientated systems are often praised for promoting rapid or seamless school-to-work transitions, their long-term effects on employment trajectories have been shown to be less advantageous, in particular regarding later flexibility in the labour market (Korpi *et al.*, 2003, Forster and Bol, 2018).

Moreover, the impact of education on employment trajectories as shaped by institutional contexts is associated with gender. Men and women benefit differently from general and vocational education. This varies across educational systems (Triventi *et al.*, 2015). Vocational education tends to be more gender-segregated than university programs (Imdorf *et al.*, 2015). Early gender segregation in educational participation is reflected later in the life course by occupational gender segregation (Smyth and Steinmetz, 2015). General skills tend to be more gender-neutral, while firm- or occupationally-specific skills tend to be more biased against women because these skills lack portability and augment employer fears of lost investments in employee skill building (Estévez-Abe, 2005). Indeed, women are faced with much more uncertainty in their employment biographies than men, including work interruptions due to pregnancy

and childrearing, with associated skill depreciation and missed opportunities during these interruptions (Estévez-Abe, 2005).

The complex relationships among education, employment trajectories, and gender are difficult to tease out and necessitate analyses of in-depth longitudinal data covering a broad span of the adult life course. A particularly powerful descriptive method for analysing such data is sequence analysis (SA), which allows researchers to consider whole sequences of education and employment biographies comprised of multiple transitions between different activities (Simonson *et al.*, 2011). Within these analyses it is possible to consider variation both between life courses in comparative perspective and also the variation or differentiation that occurs within a life course over time (Aisenbrey and Fasang, 2010). Although research has begun to examine gendered employment biographies and educational pathways in comparative perspective (Simonson *et al.*, 2011, Antonini *et al.*, 2020, Haas and Hadjar, 2020), the interplay of these three variables from a life course perspective remains largely unaddressed. The purpose of this paper is to employ monthly longitudinal data from Canada and Germany to examine this education-to-work nexus in a comparative approach.

Institutional Context

Canada and Germany provide two diverse Western world extremes in the ways that educational systems address general and vocational education and training. We utilize purposively chosen representative case studies in an exploratory comparative approach (Seawright and Gerring, 2008). More specifically, we investigate in depth the life trajectories of adults from one Canadian province, British Columbia, and one German Länder, Hessen. Both Canada and Germany are federal states that delegate much policymaking to the provincial level and thus education systems differ within each country, which makes a provincial level focus useful for comparative study. However, national commonalities in the logic of education systems can also be drawn and contrasted with one another.

The traditional German school system belongs to the category of ‘sponsored mobility,’ coined by Ralph Turner (1960), and is characterized by high levels of educational stratification where early sorting leads to either vocational education and training or university. Historically, in most German Länder (provinces), children were selected at age 10 for entry into three different school tracks that were intended to prepare them for specific occupational destinations. The *Hauptschule* and *Realschule* prepared youth for professions in the trades or commercial occupations, while the *Gymnasium* prepared youth for academic study at universities. One of the effects of this traditional tripartite school system was relatively high social inequalities (Bellenberg and Forell, 2012).

Germany still has two relatively distinct parallel systems of post-school education: vocational education and training system (VET) *and* university level education (Ebener and Uhly, 2016). The *Gymnasium*, designed originally to prepare a small proportion of elite graduates to enter graduate level university study, is a legacy that continues to exist despite recent reforms in higher education. VET is considered to

be a key asset in employing and then successfully integrating young workers into the labour market. Vocational education is intended to ‘provide a high degree of job-specific skills, something that may simplify the school-to-work transition’ (Korpi *et al.*, 2003, p. 18). In 2019, only 30% of Germans aged 25-64 had earned tertiary level credentials.¹ Of 25-34 year olds, 34% of women and 32% of men have earned tertiary level credentials (up from 27% and 24%, total 26%, respectively in 2007) (OECD, 2020).

Analyses of German data sets have revealed that in relation to increasing educational levels, women experience substantial earnings gains at the beginning of their careers. Over time, however, income levels of women remain relatively stable and do not increase when compared with men (Tarvenkorn and Lauterbach, 2009, Blossfeld *et al.*, 2015). Esping-Andersen (2009) points out that labour market participation by women in Germany is characterized by high rates of part-time work. The earnings gap of tertiary educated women aged 25-64 who were employed full-time is 74% (OECD, 2020).

In Canada, in contrast, provincial educational systems generally adhere to what Turner (1960) defined as a ‘contest mobility’ framework. Unlike systems embracing sponsored mobility, the central goals of contest mobility are to enhance educational

¹ In this paper, we use the term ‘tertiary education,’ which is synonymous with ‘post-secondary’ or ‘higher’ education. In Canada, admission to tertiary level education normally requires high school graduation or its equivalent. In Germany, the *Abitur*, which is the credential earned upon completion of academic study at the senior secondary level, is required for admission to tertiary education. Vocational education (VET) in Germany is part of the secondary system which students enter following completion of lower secondary education.

participation for the greatest number of individuals, to minimize tracking within the educational system, and to keep participation in education openly available as long as possible. Almost all students attend comprehensive general schools and rather than rigid and early selection or sorting, tracking is covert through curricular differentiation in courses during the last two years of high school (Adamuti-Trache and Andres, 2008). Tertiary institutions, and in particular universities, select their students according to stringent requirements. Because Canada places high priority on university education, this can have important effects on educational and labour market trajectories.

In Canada, public policy favours general rather than vocationally oriented education as the best means to equip young people to meet the demands of the economy. According to the OECD (2020) in 2017 the proportion of adults aged 25 to 64 with tertiary level credentials was 59%, up from 40% in 2007. Of those aged 25-34, 71% of women and 55% of men (total 63%) had earned tertiary level credentials in 2019 (up from 63% and 49%, total 56% in 2009), the second highest of OECD countries. Since 1981/1982, more women than men in Canada have earned bachelor's and professional degrees and since 1988 women surpassed men in terms of university attendance. However, the latest (OECD, 2020) figures indicate that the earnings of tertiary educated women aged 25-64 who were employed full-time in 2018 was 72% of that of men's earnings.

To summarize, the German educational system is comprised of two distinct systems: the vocational education and training system (VET) and university level education. German students are sorted early into one of these streams with the clear intention of tailoring educational attainment to the needs of the labour market. Completion of the *Arbitur* is required for admission to tertiary education, which in Germany, means university education (both traditional and applied). Those in

vocational stream continue to pursue VET which is located within the upper secondary system and is not considered tertiary education (see Lehmann, 2008) for a detailed historical account). In Canada, almost all secondary education occurs within comprehensive schools with the goal of keeping educational options open until the time of completion of studies. Tertiary institutions – which in Canada means university and non-university institutions such as colleges or technical training institutions – admit their students based on criteria such as grade point average and courses completed during secondary studies. The level of specificity of credential earned depends on the institution and program of study. For a more detailed discussion, (see Pullman and Andres, 2015, Andres and Pullman, 2018). In both the German and Canadian systems, there is considerable complexity, nuance, and changes over time which is beyond the scope of this paper.

These two educational systems exist in societies that differ substantially in terms of labour market structures. Based on the varieties of capitalism literature, Germany is considered a *coordinated market economy* which traditionally takes a long term and cooperative approach with multiple stakeholders to define core competencies and determine how to train workers. The goal is long term employment security. As a *liberal market economy*, education in Canada is characterized by more fragmented coordination and co-operation among employers, which is reflected in the organization of the educational system (Hall and Soskice, 2001, Thelen, 2004, Andres, 2015b). Because of scepticism by firms to participate in the education and training of future employees, individuals invest in themselves by earning credentials in the tertiary educational system with the belief that educational attainment will lead to paid employment.

Canada and Germany also differ in their socially expected gender roles and family/reconciliation policies. Maternity leaves are strongly shaped by previous employment statuses in both countries, where women typically receive up to one year of leave paid as a proportion of their previous income. In Germany, the ‘male breadwinner/female part-time carer’ model is still actively promoted. Child care provision lags behind other European countries, especially for children under three years old (Gornick and Meyers, 2003; Misra, 2007 #964). Maternal employment is more socially accepted in Canada, where both parents are typically employed (Antonini *et al.*, 2020). However, no public child care exists in Canada outside of Quebec. Private day care places are often very costly for families, even when subsidies are available. In Germany, public childcare provisions remain much more limited than the demand (Fagnani, 2007). Thus, child care provides a significant barrier to maternal employment in both contexts.

Despite strong differences between these two contexts, the German model of education, with its strong emphasis on vocational education, is often held as a standard by policy makers to which Canada should strive (Lehmann, 2008, Conference Board of Canada, 2015). This longstanding but contested argument (Meredith, 2011) emphasizes the existence of an over-supply of graduates from academic programs and an under-supply of graduates from applied studies including skilled trades, which trigger claims of inefficient school to work transitions resulting job and skill mismatch. However, when compared to university graduates, the OECD (2016a) reports that German VET graduates experience lower employment rates across the life course, lower earnings, and higher risk of long-term unemployment and skill obsolescence in later life. How the impact of educational policy directions in Canada and Germany plays out over the life course is not clear and warrants more detailed scrutiny.

Life Course Perspective

We employ a comparative life course approach to unravel the relationships among educational participation, tertiary educational attainment, labour market outcomes, and income inequality of women and men in Canada and Germany. That ‘time matters’ is central to life course theory (Heinz *et al.*, 2009); hence, we focus on the interrelationships among participation in various life spheres across time. The concepts ‘normative patterns’ and ‘discontinuities’ that are key in life course theory are used to compare the actual order, timing, and sequencing of transitions (e.g., tertiary participation, entry into and participation in full-time and part-time employment, interruption, and exit from the labour force) both within and between countries (Elder, 1991, Hagestad, 1991, Hareven, 2000).

Our analyses seek to determine the relationship between the nature and sequencing of multiple life events and eventual life chances. Rindfuss, Swicegood and Rosenfeld (1987) suggest that participation in one or more life spheres (e.g., the labour market, tertiary education) at an earlier point in time, and the extent of ‘order’ or ‘disorder,’ influences outcomes in other life spheres at later points in time. Others, such as Furlong and Cartmel (2007) claim that the implications of a ‘disordered’ life course may be problematic in terms of opportunity structures and subsequent life chances. They argue that today people may believe they are in command of their own destinies by ‘choosing’ from a multitude of paths and routes. However, multiple entry and exit points and increased options within societal institutions such as the tertiary system and the labour market may ‘obscure the extent to which existing patterns of inequality are simply being reproduced in different ways (p.7).

By its very nature, a life course perspective engages with lifelong education. Our comparative analyses examine educational activities over time, from young adulthood through to middle age. The interrelationship between the education system and the labour market in both contexts is central to our analyses. While lifelong education includes formal, non-formal and informal patterns of education (Tuijnman and Boström, 2002), here we focus on formal education.

‘Successful’ labour market entry and employment biographies typically have been defined as linear and sequential activity statuses that adhere to certain social expectations (Brückner and Mayer, 2005) and are premised on a male full-time worker model. As Dannefer (2003) points out, ‘a major theme in the literature on the modern life course has been to assert its relatively orderly and age-graded role structure’ (p. 649). Over the course of the 20th century, ‘these patterns became increasingly standardized in the familiar form that has come to be called the “three boxes of life” – of education, work and retirement’ (p. 649). Such trajectories clearly do not fit those of women’s lives.

Despite an enormous increase in the educational levels of women beginning in the late 20th century, issues of childbearing and childcare complicate women’s employment biographies. We endeavour to reveal the extent to which the educational systems in Canada and Germany serve as structuring mechanisms which set the stage for order or disorder in the labour market by both by women and men. In particular, we focus on gender differences in terms of trajectories and outcomes. Esping-Andersen (2009) indicates that overall employment rates and related income levels mask the extent of gender inequality. He asserts that the real analytical challenge is to explain these dynamics and to identify related consequences. To get to the heart of this issue, he

argues that the extent of labour market stability or instability across the life course requires examination.

Research Design

As described above, our goal in this paper is to use comparative longitudinal data to describe the long-term effects of education on labour market outcomes. Often in comparative analyses, a common typology is created in which to analyse data from two or more countries. While this approach is parsimonious, it masks the unique features of each system. The different educational structures in Canada and Germany are more unlike than alike and our goal is to reveal them in relation to educational and occupational trajectories and related labour market outcomes in their specific institutional context. Hence, rather than striving for parsimony, we have undertaken a diverse case study approach where we examine in depth the typical types of trajectories found in each sample.

Research Questions

This exploratory investigation is hypothesis *seeking* rather than hypothesis testing (Seawright and Gerring, 2008). Specifically, we ask: what is the order, timing, and sequencing of life course transitions of Canadian and German young adult women and men across time? Do different trajectories group into clusters based on shared activity statuses or transitions, and if so, how can the clusters be defined? To what extent can clusters be differentiated by gender, social, and economic factors like earnings or labour market participation by country? This is important for public policy, where enabling individuals – particularly women – to combine educational participation, family life, and employment is a key goal for enhancing individual life chances and social equality (Esping-Andersen, 2009).

Data

Currently, two such data sets exist that permit such detailed longitudinal comparative analyses: the *Paths on Life's Way (Paths)* project in British Columbia, Canada and the Hessen, Germany *Pathways from Late Childhood to Adulthood: Context and Development in Adolescence as Predictors of Productive Life-Courses (LifE)*. Both studies have survey components, contain representative province (BC) and Länder (Hessen) wide samples, and span 28 and 33 years, respectively. Both data sets are informed by the body of research on the life course and youth transitions and allow for a focus on the interplay between individual characteristics and structural effects across time. The *Paths and LifE* data bases are uniquely positioned to allow us to put together the complex puzzle of the enduring and changing relationships of individuals from their late teens to around age 45.

The *Paths on Life's Way* project began as an investigation of how and why young people in British Columbia, Canada chose various post-high school destinations. Six waves of panel survey questionnaire and interview data collection (1989, 1993, 1998, 2003, 2010, 2016) have been conducted. The *Paths* database contains detailed information including secondary and tertiary education, employment, unemployment, and 'other' activities and personal background information from around 18 to 45 years of age. Like all longitudinal surveys, attrition has been a challenge. The 516 survey respondents who have participated all six waves represent a full 3% of the entire graduating cohort and 10% of the original respondents to the first survey wave in 1989. However, the sample has remained very representative. The sample is slightly more biased toward females (57% in 1989; 61% in 2016), tertiary participation directly out of high school (76% in 1989; 84% in 2016) and mothers with low levels of education

(50% in 1989; 41% in 2016). Differences in other key indicators of attrition bias are 5% or less (for more detail, see Andres, 2017, Andres and Pullman, 2018) and the *Paths* website (<http://blogs.ubc.ca/paths/>).

For the Canadian analysis, we use data from the respondents who participated in all phases of the survey mail out data collection across the entire 28 years. In total, 510 valid cases are used. The key variable of interest contains self-reported monthly activities over 334 months including the following four states: tertiary education attendance, full-time work, part-time work, and other. Each of these life course activities is considered to be a ‘state.’ Tertiary education participation follows completion of secondary school and includes attendance at both university and non-university institutions. Full-time work is defined as 30 or more hours per week. Part-time work entails less than 30 hours per week. ‘Other’ includes all activities not included in the first three categories. Individuals could have participated in more than one state at a given time (e.g., full-time tertiary attendance and full-time work); however, in sequence analysis each state must be mutually exclusive. To fulfil this requirement and to ensure ease of interpretation and comparability with the German data, more detailed categories have been restructured into four different states defined above (For more detail, see Andres, 2015a).

The German Pathways from Late Childhood to Adulthood: Context and Development in Adolescence as Predictors of Productive Life-Courses (LifE) study commenced in 1979 with 12-year-old students from the German state of Hessen who were followed until 2012 when they were 45 years old (n=1359). The LifE project is representative and contains detailed information about the educational system, including all types of school attended from sixth grade onward (e.g., Hauptschule, Realschule, Gymnasium), highest credentials earned, and jobs held to age 45. The data set contains

detailed information including full- and part-time employment, absences from the labour market, and income changes over time. The LiFE sample is biased slightly against those with migrant backgrounds (16.9% compared to 17.4% in the total population) and toward those with children (40.8% versus 33.2%). In relation to educational attainment, a lower proportion of LiFE respondents have earned Hauptschule credentials (16.7% versus 32.7% but more have earned Realschule credentials (44.1% versus 33.9%) than the total population (Lauterbach et al., 2016).

For the German analysis, we use information from 1058 respondents who participated in all phases of the survey through to age 45. Monthly information is coded from leaving the school system through to the age of 45. Post-school participation follows completion of lower secondary school which leads to VET or upper secondary school, called *Abitur*, and leads to university study and includes the following five states: attendance in VET; attendance at a tertiary institution which, in Germany, means university level study; full-time work (defined as 30 or more hours per week); part-time work (less than 30 hours per week); and ‘other’ which includes all activities not included in VET, tertiary education, or full- or part- time employment. Each mutually exclusive state is defined by the dominant activity in a given month. For more details, see (Lauterbach *et al.*, 2016) and the *LiFE* website (<https://www.uni-potsdam.de/de/life-studie/index>).

Variables

For both Canada and Germany, we employ the same independent variables to interpret the sequence and cluster analyses. These include dummy variables for gender; whether

respondents, their spouses, parents, and both respondent and one's spouse,² respectively, had earned university degrees or higher by 2016; and whether respondents have children. Also, we employ continuous variables indicating the number of months in tertiary education, full-time employment, part-time employment, and other. To examine socio-economic outcomes, we use a continuous measure of respondents' yearly individual income and total household income adjusted for family size.³ For Canada, income measures are for 2015; for Germany, 2012.

Analysis

We begin by using sequence analysis (SA) with optimal matching (OM) (Halpin, 2017) in parallel analyses to document the life course trajectories of *Paths* and the *LifE* respondents. In SA, activity statuses across time are ordered into sequences that serve as a representation of an individual's pathway across the life course (Blanchard *et al.*, 2014). The OM stage allows us to refine analysis by comparing each individual sequence with all of the others to measure the dissimilarities among them. Then, statistical clustering using Ward's method is employed on this dissimilarity matrix to create groups of similar sequences where we have maximum similarity within groups and minimal similarity between groups. Clustering is a critical step in SA, as it allows complexity reduction with the intent of determining whether meaningful groupings exist in the data. To do so, we examine the cluster solutions to find the one showing the best

² Only data reporting spousal information is limited to respondents with spouses. Otherwise, the full data sets for both countries are used.

³ For Canada, self-reported estimations of total household income **before** taxes and deductions are adjusted by the square root of household size, In Germany, total household income **after** taxes and deductions is reported (OECD, 2011).

fit in terms of statistical differentiation and theoretical interpretability of the group characteristics. Thus, we create two country-specific typologies that are used to describe and interpret our longitudinal data within the context of the specific institutional configuration of the two case studies.

Findings

Canada

Figure 1 portrays the sequence of states by gender over the entire 28-year period (334 months), from high school graduation to around age 45. Each row represents the trajectory of each individual in the sample with the colours corresponding to one of four discrete states: in tertiary education (green), full-time work (dark blue), part-time work (light blue), and other (purple). There are 510 unique sequences for each of the 510 individuals in the sample; in other words, each female and male respondent followed a unique path to mid-adulthood.

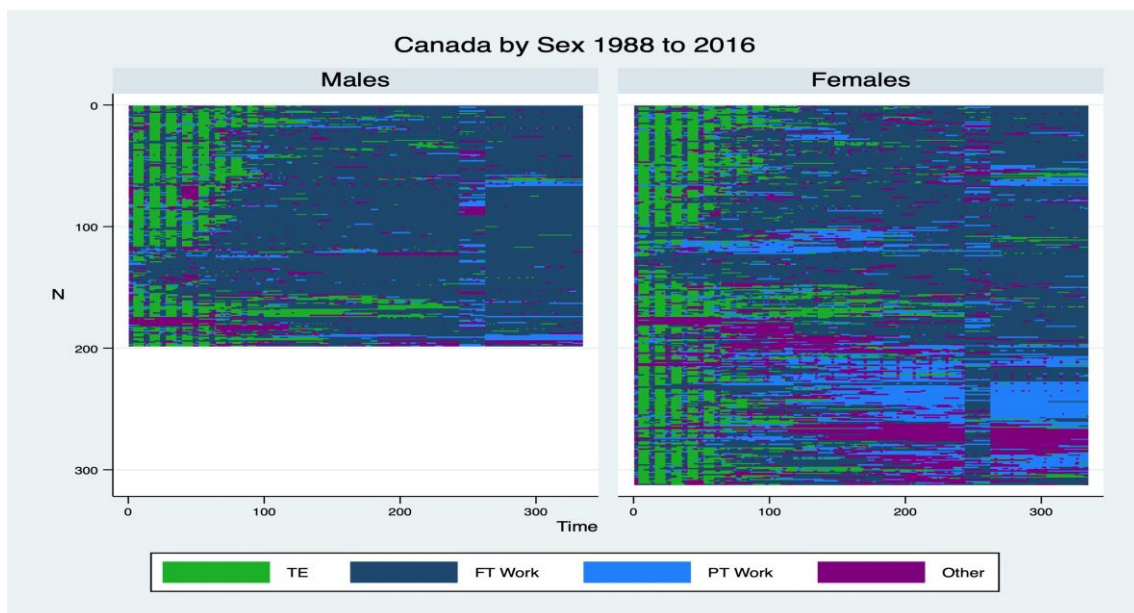


Figure 1

At first glance, sequences vary by gender. The male sequence plot is dominated primarily by tertiary participation (red) in the early years followed by mainly full-time work (dark blue). Females were more likely to be tertiary participants in the early years with 78.8% of women compared to 72.2% of men having commenced tertiary studies directly out of high school. By 2016, approximately equal proportions of women (61.6%) and men (60.6%) had earned first university degrees or greater. However, men (18.2%) were more likely than women (15.2%) not to have earned any tertiary credential over the 28 years of this study.

Gender differences are evident in the mean number of transitions between states, which is a measure of within-person differentiation (or complexity) of life course trajectories (McMunn et al., 2015; Aisenbrey & Fasang, 2010). Females experience more transitions (mean=24.5, s.d. =10.82, range 1-62) than males (mean=21.4, s.d.=10.12, range 1-54) with more women than men transitioning into part-time work and participation in other life events over the life course. In March 2016, the last month for which data were collected, 66.7% of women and 90.9% of men were in full-time employment. Part-time employment in March 2016 was 21.5% for females, and 5.6% for males. Whereas the 2015 median yearly income for *Paths* men was \$90,000, for women it was \$60,000 or 66.7% of men's earnings.

Figure 2 portrays the chronograms for each cluster that reveal the distribution of states by unit of time. Unlike the indexplot illustrated in Figure 1, chronograms conceal the individual trajectories of each individual survey respondent; however, they provide a "more digestible" (Halpin, 2014, p. 10) and hence more interpretable summary. Each chronogram is interpreted through the use of descriptive statistics that are summarized

in Table 1. The six-cluster solution provides the best fit for the Canadian data.⁴ Each cluster is described below.

Cluster A. Extended Tertiary Education to Full-time Work

Cluster A represents 23.3% ($n=120$) of all *Paths* respondents. This slightly female dominated (68%) cluster is characterized by the highest median number of months (72) in tertiary education attendance.

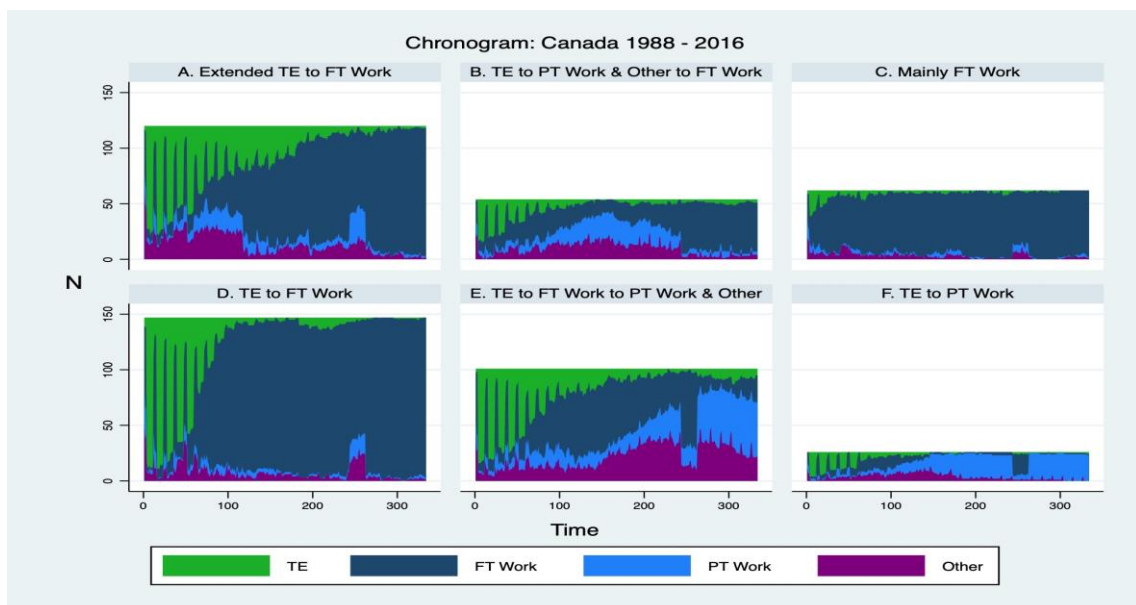


Figure 2

⁴ For the Canadian data, we employ a purposive substitution matrix for cluster analysis (0,2,2,3 \ 3,0,1,3 \ 3,1,0,3 \ 3,3,3,0) and an insertion/deletion cost of 1.5. Discrepancy measures and the theoretical interpretability of the group characteristics were used to guide our choice in the number of clusters (Studer, Ritschard, Gabadinho & Müller, 2011)

Table 1

Canada							
	Total Sample (n=510)	Cluster A Extended PSE to FT Work (n=120)	Cluster B PSE to PT Work & Other to FT Work (n=54)	Cluster C Mainly FT Work (n=62)	Cluster D PSE to FT Work (n=147)	Cluster E PSE to FT Work & Other (n=101)	Cluster F PSE to PT Work (n=26)
% Female	61	68	93	39	35	80	92
Median Months PSE	43	72	45	12	48	63	45
% First university degree or >	61	76	41	8	71	72	62
% Spouse with university degree or >¹	50	55	34	24	59	54	54
% Both with university degree or >¹	41	51	23	4	48	48	48
% Parents with university degree or >	23	20	27	9	21	34	29
Median Months in FT Work	214	201	166	298	259	126	66
Median Months in PT Work	19	19	60	5	6	67	177
Median Months in Other	25	31	51	16	15	60	35
Median 2015 Yearly Income (gross)	\$75,000	\$90,000	\$60,000	\$68,160	\$90,000	\$40,800	\$26,784
Median Household Income²	\$75,000	\$82,075	\$66,041	\$60,052	\$82,735	\$65,320	\$53,666
% with Children	77	67	87	82	77	75	92
¹ Of respondents with spouses/partners. ² Adjusted for √ family size.							

The majority (76%) of members of this cluster have earned first university degrees or greater which is the highest proportion of any cluster. A high proportion of their spouses/partners (55%) have earned university level credentials and the proportion of both respondents and their spouses with university level credentials is highest (51%) in Cluster A. However, only 20% of parents have earned university level credentials which is somewhat lower than that of the entire sample. The median number of months in full-time work is high at 201, while months in part-time work (19) is very low. The number of median months spent in other activities is moderate at 31. Chronogram A (Figure 2) reveals that a decrease in tertiary participation coincides with less participation in part-time work and other activities and increasingly more participation in full-time work over time. By 2016,⁵ almost all members of this cluster (95.8%) were engaged in full-time work. Both the 2015 median yearly income (\$90,000) and median adjusted household income (\$82,075) are higher than the median figures for the entire sample. Cluster A members are the most likely of any cluster to be childless (33%).

Cluster B. Tertiary Education to Part-time Work and Other to Full-time Work

Cluster B represents 10.6% ($n=54$) of the sample and almost all respondents are female (92%). This cluster is characterized by moderate tertiary attendance (median 45 months). Forty-one percent of cluster members, 34% of their spouses, and 27% of their parents have earned university degrees, all of which is lower than the total sample proportions. Thirty-four percent of couples in Cluster B have both earned university degrees. Employment patterns reveal more time spent in part-time work and other

⁵ The data point March 2016, which is the last month-to-month data collection point, is abbreviated as “in 2016” here and in the description of the clusters.

activities which eventually lead to full-time employment. As indicated in Figure 2, Chronogram B, by 2016 the vast majority of cluster members were employed full-time (81.5%), 5.6% were employed part-time, 7.4% were engaged in other activities, and 5.6% were attending tertiary institutions. The 2015 median yearly income (\$60,000) and median adjusted household income (\$66,041) are lower than the median for the entire sample. Most cluster members (87%) have children.

Cluster C. Mainly Full-time Work

Cluster C highlights a school to direct full-time work transition representing 12.2% ($n=62$) of the total *Paths* sample. Following high school graduation, most individuals in this male dominated (61% male) cluster spent a brief period in tertiary education, part-time work, or other before transitioning into full-time employment as indicated by the dominance of dark blue in Figure 2, Chronogram C. Members of this cluster have the lowest median months in tertiary education (12) and are the least likely of any of the clusters to have earned first university degrees or higher (8%) or to have spouses (24%) or parents (9%) with this level of credentials. Also, only 4% of couples both hold university level credentials. Median months in full-time work are highest in this cluster (298) and median months in part-time work (5) and other activities (16) are both lower than the sample median. In 2016, 96.8% of this cluster was employed full-time. Both 2015 yearly income (\$68,160) and median adjusted household income (\$60,052) are lower than the sample medians. The vast majority (82%) have children.

Cluster D. Tertiary Education to Full-time Work and Other

Cluster D is the largest among the six clusters and represents 28.8% ($n=147$) of the

sample. It is a male dominated cluster (65%) characterized by moderate levels of tertiary participation (median 48 months). A high proportion have earned first university degrees or greater (71%) as have their spouses (59%); 48% of couples in this cluster both have earned university degrees. The proportion of parents with earned university credentials is slightly lower (21%) than that of the entire sample. Median months in full-time work is high (259), low in part-time work (6), and other (15). According to Chronogram D (Figure 2), by about nine years following high school graduation, almost all cluster members (98.1%) were employed full-time. The median yearly income is tied with Cluster A as the highest of all clusters at \$90,000 and median adjusted household income is almost the same as Cluster A at \$82,735. The proportion with children is 77% which is the same as for the total sample.

Cluster E. Tertiary Education to Full-time Work and Other

Cluster E represents 19.8% ($n=101$) of all respondents. Compared to the entire sample, a higher proportion of individuals in Cluster E are women (80%) who have spent a median of 63 months in tertiary education which is well above the sample median. Also, a high proportion of cluster members (72%), their spouses (54%) and parents (34%) have earned first university degrees or greater, all of which are higher than in the total sample. Also, a high proportion of couples (48%) are both university degree holders. However, high educational levels have not been translated into full-time employment. Members of this cluster have spent a median 126 months in full-time employment and 67 median months in part-time work and 60 median months in other activities. Chronogram E (Figure 2) portrays a switch from full-time to part-time work over time and by 2016, only a small proportion (23.8%) of cluster members were employed full time; most were working part-time (48.5%) and 5.9% were attending tertiary education.

Participation in other activities (21.8%) in 2016 is highest in this cluster. Employment patterns are reflected in earnings levels; the 2015 median yearly income for Cluster E members was \$40,800 which is much lower than the sample median income. Median adjusted household income is at about the sample median at \$65,320 which suggests high spousal incomes. Seventy-five percent of cluster members have children.

Cluster F. Tertiary Education to Part-time work

Cluster F is the smallest cluster representing 5.1% ($n=26$) of respondents. It is almost exclusively female (92%). The median number of months spent in tertiary education is comparable with the sample median at 45, as is the proportion with earned first university degrees or higher (62%). Both the proportion of spouses (54%) and parents (29%) and both members of couples (48%) with university level credentials is slightly higher than that of the entire sample. Members of this cluster have spent the lowest median months in full-time employment (66) and the highest in part-time work (177). The median number of months in other activities (35) is higher than the sample median. The latter half of Chronogram F (Figure 2) is almost exclusively part-time work. In 2016, 84.6% were employed part-time and 3.8% employed full-time. When compared to other clusters, a sizable proportion were studying at tertiary institutions (7.7%) and 3.8% participated in other activities. Both the median 2015 yearly income (\$26,784) and median adjusted household income (\$53,666) is the lowest of all clusters and is 64% and 29%, respectively lower than the sample medians. Members of this cluster are the most likely to have children (92%).

Germany

Figure 3 shows the sequence of transition states by gender from the end of secondary

school (*Haupt- or Realschule, Gymnasium*) over 324 months (27 years) to around age 45. Each row represents the trajectory of an individual in the sample with the colours corresponding to one of five discrete states: in tertiary education (green), vocational educational training (VET) (red), full-time work (dark blue), part-time work (light blue) and other (purple). There are 1057 unique sequences; like the Canadian sample, each individual in the sample followed a unique path to mid-adulthood.

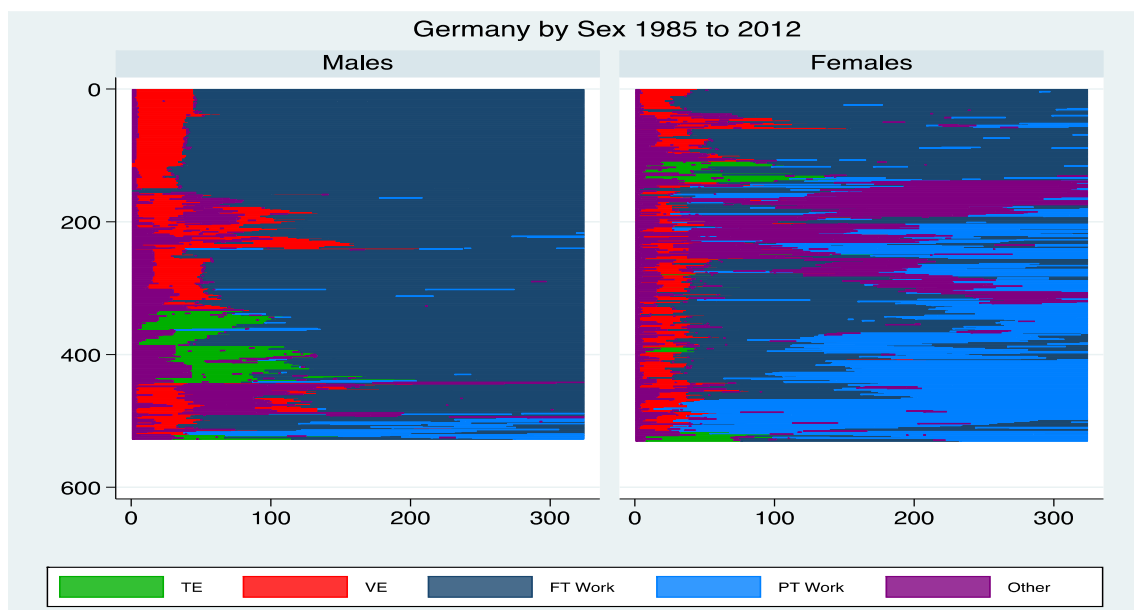


Figure 3

As depicted in Figure 3, the sequences for women and men vary dramatically. First, the paths for men show more homogeneity than for women in terms of full-time work. The trajectories for women are more varied. The sequence plots of males are dominated by continuous full-time work (dark blue) that begins immediately after completing VET programs or tertiary education. A much higher proportion of females commenced in the categories ‘other’ or ‘part-time work’ (light blue) immediately after the VET (red) or tertiary education (green). Also, when compared to men, time spent by women in VET (red) is much shorter. The median number of months in full-time work

is 218 months. Men were in full-time work for a median of 258 months and women for 162 months. Regarding part-time work, the median for women is 113 months; for men it is 74 months. Gender differences are evident for part-time work and the other activity category. The life patterns of women when compared to men can be described as much more outside, rather than inside, the labour market.

Concerning education, 29% of males have earned first university degrees or higher. The comparable figure for females is 19%. By examining changes across time, gender differences are apparent. On average, participants made an average of 4.5 transitions between states. Men made slightly fewer transitions (mean=4.1, s.d.= 1.21, range 1-10) than women (mean=5.0, s.d. =1.42, range 2-10) in the period after school to age 45. By April 2012,⁶ approximately 72% of all participants worked full-time, 25% work part-time and 3% were not in the labour market. Nearly all men worked full-time (96%), compared to only 48% of all women. A total of 46% of females were employed part-time and 6% were in other activities. Only 3% of men were employed part-time. This large difference in labour market participation is reflected in gender specific income differences at age 45. The 2012 median yearly net income of the males is around \$40,000 and for women it is around \$16,000. In other words, men earned 2.5 times more than women.

Figure 4 depicts the German chronograms similar to those presented for Canada with each cluster portraying the distribution of states by unit of time. Within each cluster, respondents share similar characteristics.

⁶ April 2012 is the cut-off date for the German Data. It is abbreviated from here on in to “2012.”

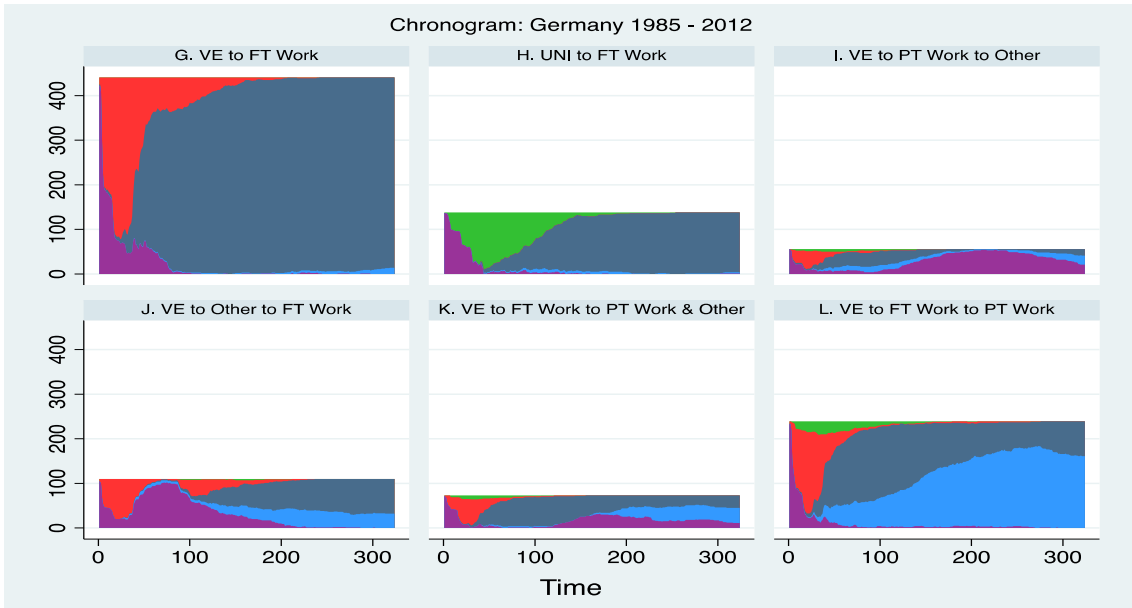


Figure 4

Table 2

Germany							
	Total Sample (n=1057)	Cluster G VET to FT Work (n=441)	Cluster H UNI to FT Work (n=138)	Cluster I VET to PT Work to Other (n=56)	Cluster J VET to Other to FT Work (n=110)	Cluster K VET to FT Work to PT Work & Other (n=73)	Cluster L VET to FT Work to PT Work (n=239)
% Female	50	25	22	95	58	93	87
Median months in university ³	0	0	75	0	0	0	0
Median months in VET ³	33	35	0	29	43	33	30
% First university degree or >	24	12	89	16	16	12	17
% Parents with university degree or >	16	9	43	11	9	21	15
% Spouse with university degree or > ¹	31	21	62	34	26	45	27
% Both with university degree or > ¹	15	6	57	13	7	11	11
Median Months in FT Work ³	212	275	221	88	136	165	122

Median Months in PT Work³	0	0	0	28	19	63	137
Median Months in Other³	19	14	26	160	82	72	10
Median 2012 Yearly Income (net)²	\$30,640	\$37,711	\$54,995	\$10,763	\$25,533	\$17,661	\$15,713
Median Household Income Adjusted for $\sqrt{\text{Family Size}}$²	\$32,776	\$33,782	\$44,442	\$25,963	\$31,426	\$29,895	\$29,029
% with children	80	71	76	95	86	99	90
¹ Of respondents with spouses/partners. ² Exchange rate year-end 2012: 1 Euro = 1,3094 CAD ³ The median for the cluster is “0” if the category within the cluster is smaller than 50% of the cluster size.							

A six-cluster solution provides the best fit for the German data.⁷ Each cluster is described below and each chronogram is interpreted through descriptive statistics summarized in Table 2.

Cluster G. VET to Full-time Work

Cluster G is the largest cluster and represents 41.7 % (n=441) of all *LifE* respondents. This cluster is mainly male dominated (75%). The median number of months spent in VET is 35 and 0 in tertiary education. Only 12% of this cluster have earned first university degrees or higher which is tied with Cluster G as lowest in terms of university attainment. The proportion of parents (9%) and spouses (21%) with earned university credentials is lower than the sample average. Also, only 9% of both respondents and their spouses have earned university degrees. Respondents in this cluster spent a median of 275 months in full-time work and 0 months in part-time work. The number of median months (14) spent in 'other' is second lowest of all clusters. Chronogram G (Figure 4) reveals that early participation in VET leads to high employment in full-time work across the life course and hence a very stable work trajectory. As such, this cluster is representative of a typical life course for males who have completed VET after lower secondary education. By age 45, nearly all members (98%) of this cluster were working full-time and none were participating in in other activities. Both the median 2012 yearly income (\$37,711) and the median adjusted household income (\$33,782) are relatively high when compared to the median income of the entire sample. Cluster G has the lowest proportion of children (71%).

⁷ For the German data, we employ a purposive substitution matrix for cluster analysis (0,2,1,1,3\2,0,1,1,3\1,1,0,0,3\1,1,1,0,3) and an insertion/deletion cost of 1.5 with discrepancy measures and theoretical interpretability guiding the number of clusters.

Cluster H. University Education to Full-time Work

Cluster H represents 13.0% (n=138) of the sample and more than three quarters (78%) are male. This cluster is characterized by high tertiary attendance (median 75 months) with almost nobody (0 median months) attending VET. Because tertiary means specifically university attendance, we have used the term ‘university’ to label the cluster. This cluster is by far the most highly educated with 89% having earned first university degrees or higher. Also, 62% of spouses and 57% of both members of couples had earned university degrees or greater, which is by far the highest of all the clusters. From a generational perspective, 43% of the parents of Cluster H respondents have earned university degrees. The median number of months in full-time employment (221) is the second highest of the six clusters. Median months in part-time employment is 0 and in ‘other’ is 26. Chronogram H (Figure 4) reveals that after a period of other activities, which for males is most likely compulsory military service, medium to long university study is followed by solid full-time work. When compared to the other clusters, Cluster H respondents have the highest income levels (2012 yearly median income of \$54,995 and \$44,442 median adjusted household income.) Over three quarters (76%) of cluster members have children.

Cluster I. VET to Part-time Work to Other

Cluster I is the smallest cluster representing 5.3% (n=56) of the sample of which 95% are women. The median number of months in tertiary education is 0 and 29 months in VET. Sixteen percent of respondents have earned first university degrees or higher which is lower than the sample average. Only 11% of parents of Cluster I members

have earned university level credentials. However, the proportion of spouses with such credentials is slightly higher than that of the sample at 34%. Yet, only 13% of both Cluster I members and their spouses have earned university degrees or greater. Respondents have spent the most time in other activities with a median of 160 months which is over eight times higher than the total sample average. The median number of months spent in full-time work (97) is the lowest of all clusters; the comparable figure for part-time work is 64. According to Figure 4, Chronogram I, the trajectories of Cluster I members began with other or VET, followed by predominately participation in other activities and part-time work. Both median 2012 yearly individual income at \$10,763 and median adjusted household income at \$25,963 are the lowest of all clusters. A full 95% of cluster members have children.

Cluster J. VET to Other to Full-time Work

Cluster J represents 10.4 % (n=110) of the sample. Women and men are more equally distributed in this cluster (58% female). The median number of months spent in VET is 43 months and 0 median months at a tertiary institution. The proportion with earned first university degrees or greater is on the low side at 16% as are the proportions of parents (9%) and spouses (26%) with these credentials. Only 7% of both respondents and their spouses have earned university level credentials. Cluster J members spent a median of 136 months in full-time work and 19 months in part-time work. The median number of months spent in other activities is 82 which is the second highest of all clusters. Chronogram J (Figure 4) reveals that a relatively long period of VET is followed by other activities and then eventually into full-time, and to a lesser extent, part-time work. Both median 2012 yearly individual income (\$25,533) and median adjusted household income (\$31,426) are lower than the total sample medians. The

proportion of Cluster J members with children is 86%.

Cluster K. VET to Full-time Work to Part-time Work & Other

Cluster K is also a small cluster representing 6.9 % ($n=73$) of all respondents. Almost all cluster members are women (93%) who have spent a median of 0 months in tertiary education and a median of 33 months in VET. Twelve percent have earned first university degrees or greater, as have 45% of their spouses and 21% of their parents. Eleven percent of both Cluster K members and their spouses are university degree holders. Cluster K members spent a median of 165 months in full-time employment which is relatively high. The median number of months spent in part-time employment (63) and in other activities (72) is much higher than the total sample median. Chronogram K shows that cluster members began primarily in VET followed by full-time work but eventually leading primarily to part-time work and other activities. Median 2012 yearly individual income (\$17,661) and median adjusted household income (\$29,895) are lower than the total sample medians. Almost all members of this cluster (99%) have children.

Cluster L. VETs to Full-time work to Part-time work

Cluster L represents 22.6% ($n=239$) of respondents and is also strongly female dominated (87%). The median number of months spent in VET (30) the same as the sample median. Members of this cluster spent 0 median months in tertiary education. The proportion with earned first university degrees or higher (17%) is lower than in the total sample as is the proportion of spouses (27%) and parents (15%) with university level credentials. The proportion of both respondents and their spouses with earned

university degrees is 11%. The median number of months in full-time employment is low at 122. The median number of months in part-time work at 137 is higher than any other cluster and the median number of months in other activities (10) is the lowest. Figure 4, Chronogram L portrays a trajectory of mainly VET followed by a long period of almost exclusively part-time and to a lesser extent full-time work. 2012 individual median yearly income is almost half of that of the total sample at \$15,713 and the median adjusted household income (\$29,029) is the second lowest. Ninety percent of Cluster L members have children.

Discussion

Our analyses demonstrate that the trajectories experienced by Canadians and Germans from late adolescence occur, on one level, in line with the ways that educational and labour market policies in their respective countries intended them to do. Sequence and related cluster analyses of the German data demonstrate two distinct groups: a small proportion who began their studies at tertiary institutions – that is, universities – and the majority who embarked on VET following compulsory schooling. In Canada, most respondents enrolled in tertiary studies following high school. They may have commenced studies at university or non-university institutions, but given the articulated structure of the tertiary system that encourages transfer from non-university to university study (Pullman and Andres, 2015), a large proportion eventually completed first university degrees or higher.

Each country specific analysis reveals additional details. Sequence and cluster analyses and related chronograms delineate clearly distinguishable life course trajectories in Germany when compared to Canada. In Germany, we see strong cluster separations by gender and type of educational participation. Clusters that are ‘ordered’

follow a traditional pattern of full-time employment; these clusters are male dominant. The highest median earnings are evident in these clusters. However, in Cluster G which represents the VET-to-work cluster, median earnings are notably lower which supports findings by the OECD (2016b) that the earnings of VET graduates do not keep up over time with those who have completed university degrees. Analyses of the Canadian data reveal that clusters that, in general, are more varied. The more normative and more traditionally ordered in terms of order university education to full-time work trajectory also have the highest earnings levels; however, women as well as men in these clusters have benefitted financially.

The indexplots and chronograms reveal considerably stronger participation in formal education across time in Canada than in Germany. It appears that the Canadian respondents, at least in terms of formal educational participation, are indeed lifelong learners. By design, the educational system in British Columbia allows for seamless re-entry into education which, in turn, helps to foster educational participation across the life course (Andres, 2015b, Cowin, 2018).

The remaining German and Canadian clusters provide a mixed picture of ‘discontinuities’ and ‘disorder’ of the education-to-work nexus. In these clusters, respondents embarked initially on some form of tertiary education followed by combinations of part-time work, other, and full-time work. Lower earnings suggest that there is a price to be paid for non-continuous full-time work.

In both the German and Canadian analyses, it is very clear that highly female dominated clusters are associated with lower earnings. These findings are consistent with recent OECD economic survey reports for Germany (OECD, 2018b) and Canada (OECD, 2018a) that highlight large earning gaps between women and men in both countries. More fine-grained analyses would reveal whether lower incomes for female

dominated clusters with variable work histories are a result of a “child penalty” or a “motherhood earnings gap.” Importantly, this may also be related to mothers’ overrepresentation in low-paying workplaces (Fuller, 2018) and their use of flexible work arrangements even when working full-time and/or in higher waged establishments (Fuller and Hirsh, 2019).

It is notable that in both countries higher levels of educational attainment are coupled with higher median months of full-time work and both are associated with fewer children. In other words, normative education to full-time work trajectories appear to be more highly associated with non-normative patterns of family formation. Also, patterns of social reproduction are evident when considering spousal and parental education and the combined educational levels of couples. High earning clusters register high on these measures in both countries. In Germany, high family educational attainment is concentrated in one cluster which is sharply distinguished from other clusters. This supports the 2018 OECD finding for Germany that the “the impact of socio-economic background on educational attainment... is still strong” (OECD, 2018b, p. 14.)

There are several limitations to our analyses. First, we have not disaggregated the category “other.” In future analyses, it would be advantageous to explore the timing of childbearing on labour market outcomes. Indeed, our analyses clearly show that clusters with a high proportion of women spent a considerable amount of time in “other,” whereas those clusters dominated by men spend almost no time in “other.” This suggests a motherhood penalty that merits further study. In addition, we have not accounted for the extent to which de-commodification of welfare provisions, or lack thereof, contribute to life chances and related levels of wellbeing in each country.

Also, we acknowledge that that university degrees, VET certificates, and other tertiary credentials differ in terms of employability and earning power. We have not captured the impact of specific credentials on outcomes. Elsewhere, we have conducted detailed analyses of fields of study by gender to help explain the earnings gap (Pullman and Andres, 2015). Moreover, while lifelong learning takes many forms, we look specifically at participation in the formal educational system. Future analyses could be extended to include lifelong learning in formal and informal workplace-based training and informal learning activities outside the workplace.

Conclusion

Our analyses provide an empirical account of the interplay of activities across the life course in relation to social inequality. We conclude that educational policy matters regarding the paths taken and related outcomes by Canadians and Germans through to mid-adulthood. It may not be surprising that the more selective German system has resulted in different outcomes in terms of educational attainment and income levels. As (Pechar and Andres, 2011) point out, “educational streaming is a powerful mechanism of social reproduction” (p. 24). If labour market and income inequality do indeed pose major risks to the future prosperity and security of members of society, to what extent do reforms that are currently underway in Germany address and attempt to redress and reduce structured inequality?

Over the past two decades and initially triggered by the first publication of the Programme for International Student Assessment (PISA) in 2000 (Ertl, 2006, Sato *et al.*, 2013) the German educational system has undergone considerable change. To increase equality of educational opportunities, the tripartite secondary school system was converted into a bipartite system in 13 out of 16 federal states. The former *Haupt-*

and *Realschulen* were combined into a comprehensive secondary school structure alongside the *Gymnasium*. Today, students are now able to attain an *Abitur* and enter university without completing their studies at a *Gymnasium*. Also, in nine of the 16 federal states, a school's recommendation regarding what type of upper level secondary educational institution the student will attend (new comprehensive or *Gymnasium*) is binding for parents; that is, parents must abide by the school's decision (Tillmann, 2013). As a result of these reforms, the educational and work trajectories of more recent cohorts may be quite different.

In Canada, one highly undesirable outcome from a policy perspective is demonstrated by the Canadian Cluster C. Members of this traditionally normative but now imperilled male dominated cluster have spent little or no time in the tertiary system and a very small proportion have earned university degrees. Although most have been employed full-time for most of their adult lives, their 2015 median earnings remain below the sample median. Although we have not investigated the nature of jobs held within each cluster, it is well documented that uneducated workers are the most likely to be in precarious employment and are the most likely to be affected by exogenous shocks. Notably, this type of 'non-participant' cluster does not exist in Germany, where individuals with similar profiles are integrated into the VET system. This highlights a potential advantage of the German system, where VET may offer a form of protection and better incomes for non-university-bound individuals, as compared to Canada.

In Germany, where there is greater employer commitment to worker retention and more corporatist structures, fewer labour market transitions or disruptions are evident. However, this appears to be the case almost exclusively for men. Women who complete VET show weak links to the labour market, with trajectories dominated by part-time and other statuses. As we discussed earlier, these 'disordered' trajectories may

harm opportunity structures and subsequent life chances; one indication of this is much lower incomes in these clusters.

Our analyses provoke questions for further research and policy. For example, if VET does not necessarily resolve the problem of low human capital and labour market integration for both men and women, what educational configurations would? Also, if higher levels of tertiary participation and completion levels by women do not eliminate gender inequalities in outcomes, what societal and economic policies – and in particular, those countering the ‘child penalty’ that has been exacerbated during the COVID pandemic – are needed to promote gender equality? Our results support public policy reform that attempts to enable both women and men to combine educational participation, family life, and employment to improve their life chances and social equality.

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