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Measuring integration of disabled persons: Evidence from Canada's time use databases

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Abstract

Disability is defined in terms of activity limitation. We propose using daily time use data as a macro indicator of the degree of integration of people with disabilities into the wider society. If activity patterns of disabled persons are becoming more similar to those of the general population, this indicates a reduction in activity limitation and suggests opportunity and social integration are increasing. Decreasing similarity of activity patterns would indicate a failure of policies promoting integration. Data on daily activities were drawn from Statistics Canada General Social Survey files for the cycles focusing on time use for 1992 and 2010. Canada-wide there has been a convergence of the activities of disabled and non-disabled persons of about 13 percent over the period examined. Convergence has been slightly greater for disabled women than men. The major source of convergence for disabled women has been a very large increase in paid work time as compared with disabled men. Our results are consistent with the proposition that public policy on disability is succeeding, but the attribution of activity convergence to policy and program interventions would require a great deal of additional research.

Keywords

Integration; Daily activity; Time use; Policy evaluation; Program effectiveness

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1. Daily activity as a measure of integration

In many countries throughout the world, Canada is considered a virtual paradise in terms of disability rights and programs (Kim, 2011). Since the publication of the highly influential *Obstacles* report (Parliament of Canada, 1981), the governments of Canada and the provinces have had the expressed goal of improving inclusion and equity for people with disabilities. Beginning with specific rights protections for disabled people in the *Canadian Charter of Rights and Freedoms (1983),* governments in Canada have systematically enacted policies aimed at bringing people with disabilities into the mainstream of Canadian life, and ensuring them the same opportunities as non-disabled citizens (McColl and Stevenson, 2008; McColl and Bond, 2013). The message from the Minister in the 2010 Federal Disability Report (Employment and Skills Development Canada, 2010) states:

> The Government of Canada has a longstanding commitment to uphold and protect the rights of people with disabilities and to help them participate fully in society. We are determined to remove obstacles and create opportunities for people with disabilities. (page i)

While this policy statement is consistent with Article 3 of the United Nations' *Convention on the Rights of Persons with Disabilities* (2007), there is considerable evidence that despite all this

effort, disabled Canadians are not much better off than they were 30 years ago. Data show that people with disabilities continue to be significantly disadvantaged on all of the important social and economic indicators. Disabled persons remain unemployed or under-employed at significantly greater levels than their non-disabled contemporaries. They are well below the national average in educational achievement, and well above the national average in poverty. Human rights tribunals across the country report that by far the highest number of complaints that they receive from designated minorities - almost half - come from disabled people (Nierobisz and Theroux 2008).

The definition of disability used in Canada is based on the World Health Organization's framework of disability provided by the *International Classification of Functioning (ICF)* and is as follows:

> This framework defines disability as impairment, activity limitation or participation restriction that is the result of the interaction between contextual factors (personal and environmental) and health conditions. (Employment and Skills Development Canada, 2011)

Such limitations or restrictions may occur at home, work or in other places. Increased similarity between disabled and non-disabled persons in terms of what they do, when they do it, where activities occur, and the presence of other people is evidence of an abatement of restrictions. We would interpret such a finding as indicating that integration is occurring and that opportunities are widening in comparison with earlier conditions.

While individual evaluations of public programs examine the success of individual departmental spending programs, there is no consensus as to whether government programming, as a whole, has expanded inclusion, integration or opportunity. Joiner (2006) asks the question, "What would it mean for people with disabilities to be treated equally?" His paper is a rare example of an attempt to operationalize concepts necessary to assess the overall success of

disability policy and programming. Amending Joiner`s question slightly we could ask, "What would it mean if people with disabilities were integrated?" As an answer, we propose that daily activity routines of disabled persons and the evolution of such routines be used as a macro-level indicator of policy success. The extent to which activities and their social contexts resemble those of non-disabled persons measures the similarity of the experience of daily life of disabled and non-disabled persons. The change in this resemblance over time measures the degree of convergence of these experiences and provides a macro-level answer to the question of policy and program success.

Language such as "removing obstacles", "creating opportunities", or "participation in society" clearly directs policy developers to consider activities as a key indicator of program success. Daily activity patterns are a reflection of the goals, opportunities and restrictions faced collectively by the population. Defining disability in terms of "activity limitation and participation restriction" suggests that time use survey data is a natural indicator of the degree of limitation on disabled individuals. The impact of disability should be observable in activity differences. Hence, behaviour that increasingly resembles that of the general population is less limited and indicates more integration. Changes in the similarity of activity patterns of disabled and non-disabled persons are then a measure of the effectiveness (or ineffectiveness) of public policy with respect to integration and expansion of opportunity.

Particularly in areas of life that are sensitive to the effects of disability, such as work, transportation and leisure, we would expect to see the participation patterns of disabled Canadians converging with those of non-disabled. The expansion of opportunity for disabled persons provides the means for more activity choices to emerge. For example, accessible transportation initiatives are expected to promote more independent travel by mobility-limited

persons. Increased access could result in more independence with respect to work, shopping or leisure, any of which eventually ought to become reflected in time use diaries. For the purposes of this research, we are suggesting that convergence with "non-disabled" patterns is a good thing – and that terms such as access and independence are desirable. That is, the purpose of this article is not to interrogate these terms or values or equations.

Although sparse, the literature over the past 15 years on disability and time use is highly consistent. Disability, regardless of origin or time of onset, has a highly predictable effect on time use. Disability tends to restrict the range of activities undertaken, increase time required (Eklund et al, 2009; Law, 2002) and limit their location. Self-care tends to take longer, and to be perceived as an inordinately time-consuming burden (Brandon, 2007; Nordberg, 2007; Chio et al, 2006; Pentland et al, 1999a). There is less time for leisure, and leisure activities tend to be passive and indoors (Crowe & Flores, 2006; Lomax et al, 2004). There is also often decreased social contact and opportunity for social relationships (Law, 2002). In fact, disability is defined as activity limitation. Recent research (McColl et al 2014) using Canadian data for 2010 from the General Social Survey (GSS) has shown that time use differs significantly between disabled and non-disabled adults for a number of activities: paid work (disabled 131 minutes per day vs. non-disabled 210 minutes per day), family responsibilities (19 vs. 30 min.), education (16 vs. 36 min.) and TV/computer time (199 vs. 145 min.).

If disability policy were doing its job in promoting the integration of people with disabilities into Canadian society, then the way disabled people spend their time would be becoming more similar to the way non-disabled Canadians spend their time, assuming that one of the key goals of such policies is integration, regardless of the politics around this term. According to the social model of disability, disability is the product of interactions between

individuals and a society that gives little consideration to different ways of being and doing. One need not fully subscribe to the social model in order to accept that the key barriers or "disablers" encountered by people with disabilities are attitudes and physical and administrative environments that do not accommodate differential abilities. While elimination of all such barriers may be idealistic, we expect 30 years of public policy and programming to have resulted in some degree of increased integration.

The proposal to use time use data as currently gathered by Statistics Canada's General Social Survey is an initial attempt to develop time use as an evaluative tool. However, the attribution of increasing activity similarity to policy initiatives is asymmetric. The hypothesis of policy effectiveness can be immediately refuted if convergence is absent. On the other hand if convergence were found, one would have to examine alternative explanations that may have been the real causes, or which may have contributed to the influence of policy and programming. This would involve a detailed comparison of provincial policy initiatives and some degree of international comparisons between Canada and other countries. This research has not been undertaken and we report nothing on this topic.

2. Methodology

Design

To examine temporal activity changes, we use Statistics Canada General Social Survey data on daily time use from 1992 to 2010. The activities of daily living can be analysed in terms of total time allocated to a set of activities. Total times in activities are known as time budgets and will be examined in some detail. Time budget similarity is the indicator of temporal change in behaviour and will be used to measure the direction of convergence.

This paper presents the results of secondary analysis of cross-sectional survey data. Although the files cannot be linked to provide longitudinal analysis of individual changes in activity patterns, they permit comparison of population and sub-population average time use over the 18 year period.

Data

The General Social Survey Program conducts an annual survey of the Canadian population to examine, in rotation, a series of social issues including caregiving, families, volunteering, time use and a number of others. Time use has been surveyed approximately every five years since 1992. The target population is typically persons aged 15 years and older, living in private residences in the provinces of Canada. Children, residents of Canada's northern territories and of institutions are omitted.

The GSS time use surveys ask respondents to report a "yesterday" diary as well as to provide a range of demographic characteristics. One of the latter is disability status. Respondents report their first activity of the day then the start and ending times of all subsequent activities on the survey day until going to sleep the following night. Table 1 shows the GSS counts for 1992 and 2010 by sex and disability status. Sex (male and female) is one of the stratification variables used to calculate respondent weights.

Disability is a self-declared condition defined by a "yes" answer to a question on activity limitation. From 1992 to 2005 the survey simply asked if a limiting condition existed. In 2010 two sets of questions were asked about the impairment type and the kind of limitation that has resulted (Grondin, 2016). Although this will provide more flexibility in future comparisons, analysis of past changes is limited to the simplest definition only.

Table 1
General Social Survey Sample Sizes:
by sex and disability

	Total	Disabled	Non-disabled	Missing disability status
1992				
Male	4002	589	3341	72
Female	4994	1051	3837	106
Total	8996	1640	7178	178
2010				
Male	6701	1448	5138	115
Female	8689	2197	6323	169
Total	15390	3645	11461	284

Measurement

Secondary data from the GSS are used as *time budgets.* Time budgets are derived from activity diaries by adding episode durations for activities so that the activity set accounts for the 24 hours of the day. These data allow us to examine the distribution of time to activity over time and by demographic characteristics.

A time budget activity set fills the day, and durations of all activities add to 1440 minutes. The 1992 and 2010 GSS employed daily diaries but other surveys sometimes continue for several days or weeks. Analysis is frequently done on a daily basis but where data permit other periods may be examined. We use an 18-way classification that is relevant to occupational therapy studies. Time budgets are average times reported for all persons for all sample days, unless otherwise noted. This means that, for example, some of the paid work times come from employed persons on weekends or holidays and from persons outside the labour force. Averages may thus be lower than are intuitively expected.

Our activities are not the same as those employed by Statistics Canada in their publications of GSS results. In particular, we identify a travel activity whereas published tables include travel in the activity for which travel was required. A published value for total paid work, excluding commuting time, is provided by Statistics Canada, making this an accurate comparator

for our time budgets, but other major activity groups are not reported net of travel time. Statistics Canada catalogue 89-647 (2011) gives paid work time net of travel as 3 hours 43 minutes for men and 2 hours 41 minutes for women, which are within four minutes of the values shown in Table 6. Published sleep times (which have no travel component) are within eight minutes of Table 6 values, indicating that our tabulations are consistent with published values.

A natural approach to measurement of time differences among groups is difference of sample mean testing. However, the sample sizes for basic comparisons of disability and gender are so large that all but very small differences are often significantly different from zero. In addition, the 18-way classification is sufficiently large that it is difficult to draw clear inferences from the combinations of significant time differences for individual activities that emerge from the data.

Dissimilarity indices offer a single comprehensive measure of distributional differences, although several can be constructed with different properties. Stewart (2006) examined several indices applicable to time use data and concluded that the weighted absolute deviation index was robust in the sense that it was only marginally sensitive to the number of activity classes defined. That means that should another research team use the GSS surveys with either a more or less detailed activity classification, their findings would not be dominated by the number of categories employed. Further, this index has a simple interpretation in that it reports the proportion of total available time that would have to be reassigned to equate two time budgets. The formula for the dissimilarity index between time budgets a and b is:

$$T = \sum_i \text{abs}(a_i - b_i) / 2880$$

where abs( ) is the absolute value of the expression in parentheses and the summation is over all n activities, i = 1 to n. A value of, for example, 0.2 indicates that some combination of reallocations of 20% of 2880 minutes will equalize the two time budgets.

3. General Social Survey description of the Canadian population by disability status

Table 2 describes the Canadian population in 1992 and 2010. In 1992 the population over 15 years estimated from the GSS was 21,294,313. This is about five percent less than the Statistics Canada intercensal estimate of 22,462,007 for the population 15 years and older (Cansim Table 051-001). In addition, respondent characteristics are occasionally missing so the target population that supplied gender and disability status was 20,818,225, reported in row one. Slightly fewer respondents provided age and activity data and about 78% provided income data.

In 1992 disabled people were 17.2% of the general population. They were, by a large majority, women, essentially evenly divided by age group, and had household incomes of about 73% of people without disabilities. Just under 58% of all persons but about a third of disabled persons reported labour force attachment (main activity as being work or looking for work). Nearly 13% of all respondents but over 30% of disabled persons were retired.

In 2010 the target population increased to 28,075,610, which is 99 percent of the Cansim estimate of 28,380,802. GSS survey coverage seems to be improving. The survey population for which disability status was available was 27,554,377. The demographic picture in 2010 was similar to 1992. By 2010 workers had been reduced to 55.8% and the retired had grown to over 16 percent. Labour force attachment of disabled persons grew to 37.3% by 2010 but fell by almost three percentage points for persons without disabilities. The trends in labour force attachment are opposite for disabled and not disabled persons. By 2010 the household income gap widened slightly.

Table 2
Canadian population characteristics, 1992, 2010 by disability status

	1992			2010		
Characteristics	**Population**	**No disability**	**Disability**	**Population**	**No disability**	**Disability**
Estimated population count	20,818,225	17,229,562	3,588,663	27,554,377	22,054,475	5,499,902
Distribution by characteristic			**Percent**			
Sex						
Female	51.0	49.4	58.7	50.6	49.4	55.6
Male	49.0	50.6	41.3	49.4	50.6	44.4
Age group						
15 to 44	60.6	66.0	34.4	49.9	55.1	29.0
45 to 64	25.7	24.6	31.3	34.1	32.5	40.7
>= 65	13.7	9.4	34.2	16.0	12.4	30.3
Main Activity						
Work/Looking for jobs	57.9	63.2	32.6	55.8	60.3	37.3
Retired	12.8	9.2	30.5	16.2	12.8	30.0
School/Child care/House work	29.3	27.7	36.9	28.1	26.9	32.7
Household Income ($2010)						
<$30000	20.0	16.6	36.9	12.8	10.1	24.1
$30000 to $79999	65.7	67.9	55.2	39.9	38.7	45.0
> $80000	14.3	15.6	7.9	47.2	51.2	30.9
Mean ($2010)	63,269	66,231	48,630	84,225	88,847	65,278

In Table 2 prevalence by disability status can be derived by multiplying the column total and the distributional percent and dividing by the corresponding population number. In 1992, disability prevalence increased from 10% for persons less than 45 years old to 43% for those over 64. Over this period, the gender difference in disability prevalence narrowed to just over 4 percentage points. In 2010 disability prevalence continued to increase with age except that the maximum for persons over 64 declined to 37.8 percent. The latter number is somewhat higher than the age specific Canada estimate of 33.2% from the Canadian Survey on Disability (Statistics Canada, 2013). However, the definitions used in the CSD and GSS differ and further analysis would be necessary to allow accurate comparisons between these sources. If the decline is genuine, it indicates an improvement in the disability status of aging people relative to the early 1990s.

4. Canadian time use trends by disability status

Table 3 describes an 18 category activity classification system derived from the detailed GSS activity codes. The categories are broadly consistent with activities identified in research in occupational therapy such as Pentland et al (1999a).

We disaggregate productive work into paid work, education and study, light and heavy housework and two kinds of family care. The physical demand of heavy versus light housework is likely a strong influence on the activities of disabled person. Our shopping and services activity includes goods and personal services, in particular medical and health care. Medical and health care received in the household is included in the personal care activity. In recognition of the rapid expansion of use of digital devices, all computing, DVD and TV activity are grouped as screen or device time. An activity, waiting, is included in recognition of the imposition of delay and waiting on disabled persons but total times involved are small.

Table 3
Activity Category Definitions

Category	Activity content
Paid work	• regular work, other jobs, and handicrafts produced for sale • break time at work, time looking for work
Education	• full time and part time programs, homework • personal study
Light housework	• most indoor chores and tasks
Heavy housework	• most outdoor and garage tasks
Child care	• household children
Adult care	• household adults
Shopping, services	• purchasing goods; use of commercial and professional services, including health care out of home
Civic, voluntary	• community organizations, voluntary help to non-household persons or causes
Sleep	• night sleep and day time naps
Eating	• at home, restaurants, work, etc.
Personal care	• personal hygiene, medical care at home, resting, thinking, reflection, prayer
Social	• socializing, visiting, entertainment, sport attendance etc.

Screen time	• watching TV, use of computers, digital devices
Passive leisure	• reading, listening to CDs, tapes etc., writing letters
Active leisure	• participation in sport, hobbies, crafts, amateur theater, music etc.
Travel	• travel to, from, between activities
Waiting	• waiting at work, for services, on phone, in class etc.
Unreported time	• not recorded or refusal to answer

The education activity includes both formal education and personal studies by adults. Travel is a particularly significant activity because it is the link between activities that occur at specific places and indicates accessibility of opportunities or services outside the residence.

Table 4 gives the time budgets for Canada for 1992 and 2010 by disability status. The major time users are sleep, paid work, screen time, four activities comprising domestic work, social leisure and eating. These activity categories were roughly the same from 1992 to 2010. The major differences from 1992 to 2010 were increases in the average times of over 10 minutes per day for screen and TV use, sleep, and personal care. These changes were offset by decreases in passive leisure, eating, active leisure, and socializing. The dissimilarity index for the whole population between 1992 and 2010 was 4 percent. That is to say a reallocation of 4% of 2880 minutes would equalize the time budgets for 1992 and 2010.

Table 4
Canada time budgets 1992 and 2010 - by disability Status (minutes)

Activity	**1992**			**2010**		
	Total	**Not disabled**	**Disabled**	**Total**	**Not disabled**	**Disabled**
Paid work	194.0	211.9	107.7	193.3	209.1	130.1
Education	29.4	32.0	16.7	31.5	35.5	15.3
Light housework	88.0	83.8	108.2	86.5	83.3	99.2
Heavy housework	32.4	32.0	34.2	28.1	27.4	30.5
Child care	22.8	24.8	13.2	25.3	27.8	15.3
Adult family care	1.1	1.0	1.3	2.8	2.4	4.2
Shopping & services	29.4	28.6	33.2	31.2	31.1	31.4
Civic, voluntary	18.2	17.9	19.6	16.6	16.0	19.1
Sleeping	492.4	489.0	508.8	503.8	501.4	513.7
Eating	87.3	86.5	91.2	74.3	73.8	76.3
Personal care	64.1	59.6	85.6	75.3	70.5	94.6
Social	88.1	87.8	89.4	77.7	77.5	78.5
Screen (TV, computer)	133.6	126.4	168.1	154.7	144.2	196.5

Passive leisure	37.9	35.1	51.1	23.7	21.5	32.8
Active leisure	49.9	49.3	53.0	38.2	38.6	36.4
Travel	68.2	71.1	54.3	74.4	77.2	63.4
Waiting	2.3	2.3	2.4	1.6	1.6	1.6
Unreported time	0.9	0.6	1.9	1.0	1.0	1.1
Total Time	1440	1440	1440	1440	1440	1440

The major difference between time budgets of disabled and non-disabled persons in 1992 was over 104 fewer minutes devoted to paid work. Disabled persons also devoted less time to travel, education, and child care but these were collectively (44 minutes) much smaller than the paid work difference. The differences were made up with increased time on screen activity (42 min.), personal care (26 min.), light housework (24 min.) and sleep (20 min.). The dissimilarity between disabled and non-disabled persons was 10.3% in 1992.

By 2010, the major activity time differences had not changed much. Disabled persons continued to spend less time working, in school, travelling, and taking care of children. Screen activity, person care and the others made up the difference. However, the overall dissimilarity between disabled and persons without disabilities declined to 8.9 percent. The absolute time difference for all activities declined from 296 minutes to 255 minutes. Disabled persons increased paid work time by an average of 22 minutes per person, or 21%, and absolute time differences declined in 14 of the 18 activity categories.

Overall, the dissimilarity index between disabled and non-disabled persons declined by over 13% from 1992 to 2010 which is evidence of convergence of time use patterns. Further, the dissimilarity index for disabled persons over the comparison period was 5.5% compared to 4% for those without disabilities. Thus the change in the time use pattern of disabled persons is about 37% greater than the change in the general population, which we interpret as a widening of opportunity for disabled persons.

5. Gender and disability

Tables 5 and 6 give the time budgets for 1992 and 2010 by sex and disability status. Male and Female were the only options given, unfortunately.

Table 5
Canada time budgets 1992 - by sex by disability status (minutes)

	Male			Female		
Activity	Male total	Not disabled	Disabled	Female total	Not disabled	Disabled
Paid work	245.6	262.3	147.1	144.3	160.3	80.0
Education	30.0	32.1	17.5	28.8	31.9	16.2
Light housework	35.7	34.1	45.5	138.3	134.8	152.3
Heavy housework	45.6	44.9	49.4	19.7	18.8	23.4
Child care	12.8	13.8	7.1	32.4	36.1	17.6
Adult family care	0.9	0.9	0.8	1.3	1.2	1.7
Shopping & services	23.8	23.7	24.4	34.8	33.6	39.4
Civic, voluntary	17.1	16.5	20.1	19.3	19.3	19.3
Sleeping	484.0	481.6	498.0	500.5	496.6	516.5
Eating	88.8	87.4	97.1	86.0	85.7	87.1
Personal care	56.8	52.6	81.3	71.1	66.8	88.6
Social	84.2	83.5	88.4	91.9	92.3	90.1
Screen (TV, computer)	149.0	141.9	190.3	118.9	110.6	152.5
Passive leisure	37.2	34.5	52.7	38.5	35.7	50.0
Active leisure	52.5	51.4	59.0	47.4	47.0	48.8
Travel	73.2	75.9	57.5	63.4	66.2	52.1
Waiting	2.3	2.3	2.8	2.3	2.3	2.2
Unreported time	0.7	0.6	1.2	1.0	0.7	2.4
Total Time	1440	1440	1440	1440	1440	1440

The tables show that the main gender differences in activities are paid work, the domestic work group (including shopping), and screen time. Men spend much less time in housework, which is made up largely with more time in paid work and leisure. These differences are roughly the same for the 1992 and 2010 data.

The male-female dissimilarity index was 12.2% in 1992, indicating that activity differences by gender are greater than differences by disability status (10.3%) and much greater than the change in the general population activity over time (4%). However, by 2010 the gender difference had decreased to 9.8% (a 20% reduction), a much greater decline than the 13% disabled/non-disabled decline. The major component of the male-female convergence was a

shrinking of the gender difference in paid work from 102 minutes to 64 minutes. This illustrates a major change in the economic prospects for women.

Table 6
Canada time budgets 2010 - by sex by disability status (minutes)

	Male			Female		
Activity	Male total	Not disabled	Disabled	Female total	Not disabled	Disabled
Paid work	225.8	241.4	153.9	161.7	175.9	111.1
Education	30	33.5	14	32.9	37.5	16.3
Light housework	52.2	51.2	56.8	120	116.3	133.1
Heavy housework	37.5	36.3	42.9	18.8	18.3	20.7
Child care	16	18	6.6	34.4	37.8	22.2
Adult family care	2.7	2.6	3.2	2.9	2.3	5.1
Shopping & services	26	25.6	27.5	36.2	36.7	34.4
Civic, voluntary	15	14.2	18.5	18.2	17.8	19.7
Sleeping	497.8	496	506.1	509.8	507	519.7
Eating	76.1	75.6	78.6	72.6	72	74.4
Personal care	69.1	63.4	95.3	81.3	77.8	93.9
Social	72.8	73.6	69.1	82.4	81.4	86
Screen (TV, computer)	174	162.3	227.6	135.8	125.7	171.7
Passive leisure	21.6	19.4	31.3	25.9	23.6	34
Active leisure	43.2	43.9	39.9	33.3	33.2	33.6
Travel	77.5	80	65.8	71.5	74.3	61.5
Waiting	1.7	1.6	2.1	1.5	1.6	1.2
Unreported time	1.2	1.3	1	0.8	0.8	1.2
Total Time	1440	1440	1440	1440	1440	1440

Time budgets of disabled men

The major activities of disabled men in order of time allocation in 2010 were sleep (506 minutes) screen use (228 minutes), paid work (154 minutes), personal care (95 minutes), eating (79 minutes) and the domestic work group (110 minutes) . The major disabled/non-disabled differences were smaller allocations of time to paid work, travel, family care, and education by disabled men. These were offset by larger allocations to screen time, personal care and passive leisure. The differential in screen time increased to 66 minutes from 48 minutes in 1992,

emphasizing the major role television and digital media play in the leisure time of all men but especially of disabled men.

The dissimilarity between disabled and non-disabled men was 10.8% in 1992 and 9.8% in 2010, a decline of just over 8 percent, indicating overall convergence of activities. The paid work time difference declined from 115 minutes in 1992 to 88 minutes in 2010, a product of increasing work time by disabled men and declining work time by men without disabilities.

Time budgets of disabled women

The major activities of disabled women in 2010 were virtually the same as those for men: sleep (519 minutes), screen time (172 minutes), paid work (111 minutes), the housework group (181 minutes) and personal care (94 minutes). As was the case for men, the major differences from non-disabled respondents are less paid work time (65 minutes) and education (21 minutes) and more screen time (46 minutes), and personal care (16 minutes). Paid work time for disabled women rose from 80 minutes per day in 1992 to 111 minutes in 2010, an increase of 38 percent, as compared with an increase of less than 3% for men. There has been a strong trend towards higher employment for disabled women over the study period.

The dissimilarity between disabled and non-disabled women was 9.1% in 1992 and 8.1% in 2010, a decline of 11 percent, again indicating a convergence. Women's time use by disability status is relatively more similar than that of men and convergence has been slightly greater.

Time budgets of disabled men and women

The major differences in 2010 between time budgets of disabled men and women were paid work and screen time, in which men spent cumulatively 102 minutes more than women. Balancing those activities were the domestic work group, social leisure and a number of others. The difference in the use of screen media and games of 56 minutes was substantially greater than that difference for non-disabled persons. It is clear that screen use is a much more important activity for disabled men than for any of the comparative groups.

In 2010, the dissimilarity index between disabled men and women was 9.6 percent, down from 11.2 percent in 1992. The 14.3 percent convergence between disabled men and women is less than the overall gender convergence of 20 percent.

5. Conclusions

Canadian data indicate that there has been convergence of the time budgets of disabled and non-disabled persons of over 13 percent between 1992 and 2010. Increased similarities were found in times spent in paid work, housework, sleep, leisure and travel. Increasing differences in screen time of disabled and non-disabled persons partly offset the overall similarity increase. Television and computer screen activity remains the major leisure activity of disabled persons and this has been increasing over time. Convergence has been slightly greater for disabled women than men. The major source of convergence for disabled women has been a very large increase in paid work time as compared with disabled men. This achievement is more remarkable given an overall small decline in work time in the population of persons without disabilities.

In our introduction, we alluded to the importance of activity contexts such as persons present and location in describing activity patterns. Our examination of time budgets omits those dimensions. It is possible to extend the analysis of diary data by examining activities as they

occur in sequences of fixed time blocks during the day. For example Wilson (1998, 2008) has applied dynamic programming alignment methods to diaries extracted from GSS data. This is a promising approach to examining activity similarity including dimensions of location and accompaniment.

We also emphasized the asymmetric relationship between confirmatory and contradictory evidence in the attribution of influence to public programming initiatives. Our findings in support of activity convergence in principle can be ascribed to factors other than public policy and programming. Had convergence been absent, it would have been clear that policy had been ineffective. The degree of convergence that we have found may have arisen from factors that are independent from government programming such as stronger social connectedness (say through social media), growing national wealth, or community activism. One way to examine such factors would be through interprovincial or international comparisons of diary surveys that include jurisdictions with different levels of disability advocacy and policy development. That is fertile ground for further research.

We alluded to the increased level of detail in the questions used to identify disabled respondents in the 2010 and 2015 surveys. The release of the 2015 GSS dataset, probably in late 2016, will permit us to separate progress towards integration by different types of disability. This will highlight areas of relative strength and weakness in disability programming.

The other question that arises, given what we have found regarding convergence and integration, is whether progress made to date has been adequate. This introduces major political and cost-effectiveness questions that we have not examined but which are part of the story of disability policy development.

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