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The Temporal Stability of Children's Neighborhood Experiences: A Follow-up from Birth to Age 15

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ABSTRACT

The Temporal Stability of Children's Neighborhood Experiences: A Follow-up from Birth to Age 15

Despite increasing attention being paid to the temporal dynamics of childhood disadvantage, children's neighborhood characteristics are often measured at a single point in time. Whether such cross-sectional measures serve as reliable proxies for children's long-run neighborhood conditions depends on the stability in children's neighborhood experiences over time. We investigate the temporal stability in children's neighborhood environment, focusing on two of the most commonly studied neighborhood characteristics: The ethnic composition and mean income of the neighborhood. Using Dutch population register data, we follow an entire cohort of children from birth up until age 15. We use year-to-year correlations in the percentage non-Western minorities and the mean income in the neighborhood to evaluate the temporal stability of children's neighborhood experiences. Children's neighborhood characteristics were found to be more stable over time with regard to ethnic composition than with regard to income. Children who had moved at least once were found to have lower stability in neighborhood characteristics than children who never moved. Finally, neighborhood experiences were found to be more stable over time for ethnic minorities than for the native Dutch, although differences were small with regard to income. Single point-in-time measurements of neighborhood characteristics are reasonable proxies for the long-run ethnic composition of children's neighborhood environment, but rather noisy proxies for the long-run income status of their neighborhood, particularly for those who moved.

JEL Classification: J13, J62, O18, R23

Keywords: neighbourhood experiences, neighbourhood environment, children, income, temporal dynamics

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1. Introduction

Over the past decades, there has been a growing interest among social scientists in to what extent and how characteristics of the neighborhood in which people live influence various individual outcomes, such as educational achievement, employment, delinquency, and health (e.g., Luke & Xu, 2009; Sampson et al., 2002; van Ham et al., 2014). Although 'neighborhood effects' have been found across the life course, neighborhoods seem to be more relevant for children and adolescents than for adults, because young people are more likely to spend a great proportion of their time in their local environment (Duncan et al., 2001). Neighborhoods have, furthermore, been shown to have a stronger effect on individual outcomes in cases where residents had been living in the neighborhood for a long period of time due to accumulated exposure to risks and/or opportunities (Galster, 2012; Hedman et al., 2015). Thus, in other words, especially young people who have been consistently exposed to socioeconomically deprived neighborhoods may experience negative outcomes.

Despite the fact that research increasingly recognizes the importance of the temporal dynamics of childhood disadvantage, children's neighborhood characteristics are still frequently measured at a single point in time (Assari et al., 2016; de Vuijst et al., 2015; Page & Solon, 2002; van Ham et al., 2014). Whether or not such point-in-time measures serve as valid proxies for the neighborhood conditions that children endure in the long run depends on the amount of continuity or change in children's neighborhood environment over time. The literature is inconsistent in this regard. One line of research argues that single point-in-time estimates are almost or just as good as longitudinal measures of neighborhood composition during childhood, suggesting that children's neighborhood environments are stable over time (Jackson & Mare, 2007; Kunz et al., 2003). Other research shows, however, that longitudinal measures yield stronger effects than cross-sectional measures of neighborhood characteristics, highlighting the need to take temporal dimensions into account (Crowder & South, 2011; López Turley, 2003; South & Crowder, 2010).

The main aim of this research note is to provide more insight into the stability of children's neighborhood experiences over time. We focus on two of the most commonly studied neighborhood socioeconomic characteristics: the mean income and ethnic composition of the neighborhood. Our study contributes to previous research in three important ways. First, whereas prior research on neighborhood histories of children has mainly used relatively short periods of observation, we observe almost the entire childhood life course. Over a longer observation period, there is likely to be greater variation in neighborhood characteristics because families had more time to move to another neighborhood and because neighborhoods had more time to change. Second, whereas previous studies on neighborhood histories of children are confined to the US, we focus on the Netherlands. Extant research shows that the US have lower levels of social and economic mobility than northern and western European countries (Isaacs, 2008). Assumptions about the temporal stability of children's neighborhood characteristics from US research may therefore not be valid in the European context. Third and lastly, we pay attention to potential ethnic differences in neighborhood stability over time. Quillian (2003) showed that although black American families are as likely as white families to move, they have greater difficulty 'escaping' poverty neighborhoods. This suggests that point-in-time measures of neighborhood characteristics may more accurately represent long-run neighborhood experiences of ethnic minority children than of ethnic majority children.

2. Data

We use administrative microdata from the System of Social statistical Datasets (Bakker et al., 2014). This is a longitudinal geo-coded database of interlinked population registers covering demographic, socioeconomic, and geographic information on the entire population of the Netherlands. Data are currently available for the period 1999–2014. We select all individuals who were born in the Netherlands in 1999 and follow them up until age 15 in 2014. Children who had died or emigrated before age 15 were excluded from the analysis. This leaves us with a total research population of 179,166 children.

Neighborhoods are operationalized using 500×500 meter grids. At the beginning of the observation period in 1999, the research population was spread over 26,804 of these grid cells, containing 535 inhabitants on average. We focus on two neighborhood characteristics, namely the income distribution and ethnic composition. Regarding the income distribution, we compute, for each year, the average gross monthly income in each neighborhood. We use a natural logarithmic specification to account for the typical right-skewed distribution of income. The ethnic composition of a neighborhood is measured as the percentage of non-Western ethnic minorities in the neighborhood in each year. Following the standard definition of Statistics Netherlands, people are assigned a non-Western background if at least one parent was born in Africa, Latin-America, Asia (excluding Indonesia and Japan), or Turkey.

3. Analytic strategy

When examining stability in children's neighborhood characteristics over time, it is important to recognize the difference between *absolute* and *relative* stability as they warrant different analytical approaches (Alder & Scher, 1994). Absolute stability refers to the consistency in an individual's absolute value on multiple-time observations. A common approach to measure absolute stability is to calculate within-person standard deviations on a set of repeated measurements. However, because the income distribution and the ethnic composition of a neighborhood have very different ranges and means, the standard deviations of these variables cannot be compared directly. Although there are ways around this, such as using the coefficient of variation (i.e. the standard deviation divided by the mean), this adds a level of complexity that makes the results less readily interpretable.

Relative stability, on the other hand, refers to the consistency of an individual's rank order within a group, based on a measure across time. Relative stability has typically been represented by year-to-year correlations, i.e. the correlation between values at two different time points. The advantage of this method is that the interpretation is straightforward: Correlations close to 1 indicate a strong consistency in characteristics over time, while a correlation below .50 represents a rather low consistency (Bloom, 1964; Hinkle et al., 2003). Furthermore, most neighborhood-effects hypotheses are concerned with a neighborhood's socioeconomic position relative to that of other neighborhoods rather than, for example, the absolute percentage ethnic minorities or the absolute income level in a neighborhood.

Against this background, we choose to focus on relative stability in children's neighborhood environment over time. Specifically, we estimate year-to-year correlations in neighborhood characteristics using Pearson's r. This replicates the approach followed in previous work (e.g., Kunz et al., 2003). In order to test whether there are significant differences in the temporal stability of the neighborhood's ethnic composition and mean income, we use a range of tests for comparisons of dependent correlations with nonoverlapping variables available in R's *cocor* package (Diedenhofen & Musch, 2015). Furthermore, using Fisher's z transformation, we test whether stability of neighborhood

characteristics over time differs significantly between movers and non-movers as well as between native Dutch and ethnic minority children.

4. Results

In Table 1, we present year-to-year correlations of the percentage non-Western ethnic minorities (above diagonal) and the mean logged income (below diagonal) in the neighborhood. Following the rule of thumb for interpreting the strength of a Pearson correlation coefficient (Hinkle et al., 2003), we use a color coding scheme to facilitate readability of the tables – green indicates a very strong correlation (>.90), yellow indicates strong correlation (.70 to .90), orange indicates moderate correlation (.50 to .70), and red indicates low correlation (.30 to .50). Unsurprisingly, it can be seen that the longer the duration between two measurement moments, the lower the correlation in neighborhood characteristics. For example, the correlation between ages 1 and 10 is clearly lower than that between ages 1 and 2. Furthermore, the correlations with regard to the ethnic composition are substantially stronger than the correlations of the mean income of the neighborhood. For instance, we find a correlation of r = .74 between the year of birth and age 15 with respect to ethnic composition, as compared to r = .52 for mean logged income. As regards the statistical significance of the difference between ethnic composition and income, all the correlation coefficients for mean income were found to be significantly lower than those for the percentage ethnic minorities with p<.001.

Table 1. Year-to-year correlations of neighborhood characteristics, percentage non-Western above diagonal and mean logged income below diagonal (N=179,166)

	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
0	—	.948	.907	.874	.849	.830	.815	.802	.789	.780	.771	.764	.758	.752	.746	.740
1	.855	—	.952	.915	.887	.865	.848	.832	.818	.807	.798	.790	.783	.775	.769	.764
2	.804	.882	—	.958	.925	.900	.880	.863	.848	.836	.825	.816	.808	.800	.793	.787
3	.761	.828	.903	—	.962	.935	.913	.894	.877	.863	.852	.842	.833	.825	.818	.811
4	.724	.790	.854	.909	—	.968	.943	.921	.902	.887	.874	.864	.855	.847	.839	.831
5	.694	.759	.819	.868	.913	—	.971	.947	.925	.909	.896	.885	.875	.866	.857	.849
6	.664	.727	.782	.824	.862	.910	—	.972	.948	.930	.916	.904	.893	.883	.874	.865
7	.649	.706	.759	.800	.834	.873	.913	—	.973	.953	.937	.924	.912	.901	.891	.882
8	.632	.684	.734	.773	.802	.837	.874	.924	—	.977	.960	.946	.932	.920	.909	.900
9	.612	.663	.711	.748	.776	.809	.841	.885	.926	—	.980	.964	.949	.935	.924	.914
10	.597	.646	.693	.729	.756	.788	.815	.855	.888	.927	—	.981	.965	.950	.938	.927
11	.580	.630	.676	.708	.732	.763	.792	.828	.859	.892	.928	—	.981	.965	.952	.939
12	.575	.623	.668	.700	.724	.753	.781	.817	.848	.876	.900	.926	—	.981	.966	.953
13	.562	.614	.654	.684	.709	.735	.765	.799	.825	.853	.876	.896	.939	—	.981	.965
14	.548	.599	.640	.668	.691	.718	.746	.780	.806	.830	.848	.869	.907	.934	—	.979
15	.524	.569	.608	.635	.656	.678	.702	.733	.754	.777	.798	.813	.845	.866	.893	—

Note: Very high correlation (≥.90) in green; High correlation (.70 to .90) in yellow; Moderate correlation (.50 to .70) in orange; Low correlation (.30 to .50) in red

We proceed with testing whether children who changed residence have less stability in neighborhood characteristics over time than children who never moved. Tables 2 and 3 present year-to-year correlations for, respectively, the percentage non-Western minorities and the mean logged income in the neighborhood for movers (above diagonal) and non-movers (below diagonal) separately. As can be seen in the tables, we find that children who moved at least once have much lower correlations in neighborhood characteristics across time than children who did not move. Particularly the correlations of the percentage non-Western ethnic minorities in the neighborhood of children who never moved are strikingly high, with the lowest correlation of r = 0.95. However, while the correlations are substantially lower for

movers, the lowest correlation (i.e., between age 0 and age 15) of r = .60 still indicates a relatively strong persistence in the ethnic composition of the neighborhood of children who moved. The results with regard to mean income in the neighborhood show an overall less stable picture, but again the distinction between movers and stayers is substantial. For example, the correlation between ages 0 and 15 of r = .39 for movers is much lower than the r = .70 for children who never moved. Additional analyses (not in tables) indicate that, for both the ethnic composition and the income distribution of the neighborhood, all correlation coefficients differed significantly between movers and non-movers with p<.001.

Table 2. Year-to-year correlations of percentage non-Western minorities in the neighborhood, movers above diagonal (N=97,319) and stayers below diagonal (N=81,847)

	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
0	—	.918	.855	.803	.765	.735	.712	.691	.673	.659	.646	.637	.628	.620	.611	.604
1	.998	—	.925	.866	.821	.786	.760	.735	.714	.698	.683	.672	.662	.652	.643	.636
2	.995	.998	—	.933	.880	.840	.809	.781	.757	.739	.722	.709	.697	.686	.676	.668
3	.992	.995	.998	—	.939	.895	.859	.828	.801	.781	.762	.747	.734	.722	.711	.701
4	.989	.992	.995	.998	—	.947	.907	.872	.840	.816	.796	.781	.766	.754	.742	.731
5	.986	.990	.993	.996	.998	—	.952	.912	.877	.852	.830	.813	.797	.783	.769	.757
6	.983	.987	.991	.994	.996	.998	—	.954	.914	.885	.861	.842	.825	.809	.795	.782
7	.980	.984	.988	.991	.994	.996	.998	—	.954	.921	.895	.875	.855	.837	.822	.808
8	.977	.981	.985	.989	.992	.994	.997	.998	—	.961	.933	.910	.888	.867	.850	.835
9	.974	.978	.982	.986	.989	.992	.994	.996	.998	—	.966	.940	.914	.892	.873	.858
10	.970	.975	.979	.983	.986	.990	.992	.994	.997	.999	—	.969	.940	.916	.896	.878
11	.967	.972	.976	.980	.984	.987	.990	.992	.995	.997	.998	—	.968	.941	.919	.898
12	.964	.969	.974	.978	.982	.985	.988	.991	.993	.995	.997	.998	—	.968	.943	.920
13	.961	.966	.970	.975	.979	.982	.985	.988	.991	.993	.995	.997	.999	—	.968	.941
14	.957	.962	.967	.972	.976	.980	.983	.986	.989	.991	.993	.995	.997	.999	—	.964
15	.953	.959	.964	.968	.973	.977	.980	.983	.986	.989	.991	.993	.995	.997	.998	—

Note: Very high correlation (≥.90) in green; High correlation (.70 to .90) in yellow; Moderate correlation (.50 to .70) in orange; Low correlation (.30 to .50) in red

Table 3. Year-to-year correlations of mean logged income in the neighborhood, movers above diagonal (N=97,319) and stayers below diagonal (N=81,847)

	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
0	—	.830	.740	.667	.615	.575	.542	.515	.493	.470	.450	.437	.432	.421	.409	.387
1	.884	—	.856	.771	.712	.666	.625	.590	.562	.534	.510	.496	.489	.477	.464	.436
2	.879	.913	—	.875	.803	.748	.699	.660	.625	.592	.567	.551	.541	.525	.512	.482
3	.868	.896	.937	—	.887	.824	.766	.722	.683	.648	.620	.600	.589	.571	.554	.521
4	.849	.882	.915	.936	—	.896	.828	.780	.733	.695	.665	.641	.628	.610	.591	.554
5	.834	.872	.905	.922	.934	—	.896	.837	.785	.743	.710	.684	.668	.646	.625	.586
6	.813	.853	.886	.897	.904	.927	—	.900	.842	.795	.757	.728	.712	.687	.663	.619
7	.811	.851	.885	.896	.902	.919	.930	—	.909	.853	.810	.778	.758	.730	.707	.658
8	.804	.841	.875	.888	.890	.906	.916	.943	—	.912	.860	.824	.801	.769	.744	.687
9	.790	.829	.865	.877	.880	.895	.904	.927	.944	—	.916	.872	.844	.810	.780	.720
10	.780	.822	.857	.870	.875	.890	.894	.916	.927	.943	—	.921	.878	.840	.807	.748
11	.760	.802	.838	.846	.850	.869	.877	.900	.915	.922	.937	—	.919	.874	.837	.773
12	.758	.801	.837	.846	.850	.865	.876	.896	.907	.919	.931	.936	—	.927	.883	.810
13	.746	.795	.828	.837	.843	.860	.873	.894	.904	.914	.927	.927	.955	—	.919	.838
14	.734	.783	.816	.823	.829	.849	.863	.884	.895	.904	.909	.915	.943	.958	—	.876
15	.703	.746	.779	.788	.794	.806	.817	.840	.848	.858	.870	.870	.895	.895	.920	—

Note: Very high correlation (≥.90) in green; High correlation (.70 to .90) in yellow; Moderate correlation (.50 to .70) in orange; Low correlation (.30 to .50) in red

Finally, we examine ethnic differences in the temporal stability of children's neighborhood characteristics. In Tables 4 and 5 we present year-to-year correlations for, respectively, the percentage non-Western minorities and the mean logged income in the neighborhood for native Dutch children (above diagonal) and children with at least one parent born abroad (below diagonal) separately. Although the share of ethnic minorities who moved at least once (63%) is higher than among the native Dutch (52%), we find significantly (p<.001) stronger

year-to-year correlations in the ethnic composition of the neighborhood among ethnic minority children than among native Dutch children. For example, the correlation in the percentage non-Western minorities in the neighborhood at ages 0 and 15 among native Dutch children (r = 0.59) is clearly lower than among children from immigrant families (r = 0.72). The results are less conclusive regarding the mean logged income in the neighborhood. While the correlations in the mean logged income are higher for ethnic minority children than for native Dutch children, the differences are very small and negligible. In addition, many differences are not statistically significant with p>.01.

Table 4. Year-to-year correlations of percentage non-Western minorities in the neighborhood, native Dutch above diagonal (N=146,312) and ethnic minorities below diagonal (N=32,854)

	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
0	—	.913	.845	.791	.754	.724	.700	.680	.661	.645	.634	.624	.617	.609	.600	.592
1	.945	—	.920	.859	.814	.780	.752	.727	.704	.687	.674	.663	.653	.644	.634	.626
2	.903	.950	—	.929	.877	.836	.804	.776	.751	.732	.718	.704	.694	.682	.671	.662
3	.867	.910	.955	—	.939	.893	.856	.825	.796	.775	.758	.743	.731	.719	.707	.698
4	.838	.878	.918	.958	—	.945	.904	.868	.835	.811	.793	.776	.763	.752	.739	.729
5	.816	.853	.892	.929	.966	—	.951	.911	.873	.845	.826	.808	.793	.780	.766	.755
6	.801	.835	.870	.906	.940	.969	—	.952	.910	.879	.858	.838	.823	.808	.793	.782
7	.785	.818	.851	.886	.917	.944	.971	—	.952	.917	.893	.872	.855	.838	.822	.809
8	.771	.803	.834	.867	.896	.922	.947	.973	—	.958	.932	.908	.887	.868	.851	.836
9	.761	.791	.821	.853	.880	.905	.929	.952	.977	—	.966	.938	.915	.894	.874	.859
10	.750	.779	.808	.838	.865	.890	.912	.934	.958	.979	—	.968	.941	.918	.897	.880
11	.743	.770	.798	.828	.854	.879	.900	.921	.944	.963	.981	—	.968	.942	.919	.899
12	.735	.762	.788	.817	.843	.866	.887	.907	.929	.946	.963	.980	—	.968	.942	.920
13	.728	.754	.780	.808	.834	.856	.875	.895	.914	.931	.946	.962	.980	—	.967	.941
14	.721	.747	.773	.801	.826	.847	.865	.884	.903	.920	.935	.950	.966	.981	—	.964
15	.716	.742	.767	.793	.816	.837	.855	.875	.893	.909	.924	.937	.952	.965	.979	—

Note: Very high correlation (≥.90) in green; High correlation (.70 to .90) in yellow; Moderate correlation (.50 to .70) in orange; Low correlation (.30 to .50) in red

Table 5. Year-to-year correlations of mean logged income in the neighborhood, native Dutch above diagonal (N=146,312) and ethnic minorities below diagonal (N=32,854)

	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
0	—	.846	.799	.758	.721	.692	.658	.644	.627	.607	.591	.573	.569	.555	.541	.513
1	.880	—	.871	.818	.780	.750	.714	.695	.673	.651	.635	.617	.611	.600	.584	.551
2	.813	.906	—	.895	.845	.811	.771	.749	.723	.699	.681	.663	.655	.641	.625	.591
3	.755	.845	.920	—	.900	.860	.811	.789	.761	.735	.716	.693	.686	.669	.651	.616
4	.716	.802	.870	.930	—	.902	.847	.821	.787	.760	.741	.714	.706	.691	.672	.635
5	.682	.763	.825	.883	.938	—	.897	.860	.822	.793	.772	.745	.736	.718	.699	.657
6	.662	.738	.795	.847	.895	.940	—	.901	.858	.824	.798	.773	.763	.746	.727	.679
7	.643	.712	.765	.814	.859	.898	.943	—	.912	.871	.840	.811	.802	.783	.764	.713
8	.623	.689	.742	.788	.829	.867	.908	.952	—	.915	.874	.843	.834	.810	.791	.733
9	.606	.669	.718	.764	.802	.838	.877	.916	.952	—	.916	.877	.863	.839	.816	.757
10	.588	.649	.698	.743	.781	.815	.850	.887	.922	.958	—	.916	.888	.863	.833	.778
11	.576	.637	.683	.726	.762	.795	.826	.862	.894	.926	.958	—	.915	.883	.854	.792
12	.568	.626	.672	.713	.749	.780	.811	.844	.874	.902	.930	.955	—	.929	.897	.827
13	.558	.616	.660	.699	.734	.763	.793	.825	.850	.877	.903	.925	.960	—	.926	.849
14	.544	.602	.646	.684	.716	.742	.770	.804	.827	.852	.878	.898	.925	.952	—	.879
15	.526	.581	.622	.657	.685	.710	.738	.769	.790	.816	.840	.856	.882	.903	.925	—

Note: Very high correlation (≥.90) in green; High correlation (.70 to .90) in yellow; Moderate correlation (.50 to .70) in orange; Low correlation (.30 to .50) in red

5. Discussion

This study investigated the temporal stability of children's neighborhood characteristics, focusing on the ethnic composition and the mean income of the neighborhood. Our findings indicated that children's neighborhood characteristics are notably more stable over time with

regard to ethnic composition than with regard to the mean income. One reason for this is that we defined ethnicity based on country of birth criteria, which is obviously fixed and invariable. Thus, if children do not move, the only way in which the ethnic composition of their neighborhood can change is through migration turnover (i.e., immigration and emigration) and natural turnover (i.e., births and deaths). Income, by contrast, can also change within individuals over time, leading to a lower stability over time in the mean income of neighborhoods. Moreover, the fact that income can change within individuals over time implies that income is also more prone to measurement error, which may have reduced the observed temporal stability as well.

Furthermore, the stability of children's neighborhood characteristics over time was found to be much lower for children who had changed residence at least once than for children who never moved. While this may not be a surprising finding, it is an important finding in that it indicates that a substantial share of children experienced social mobility (either up or down) when changing residence. Yet, despite higher residential mobility rates among ethnic minorities than among the native Dutch, the stability in neighborhood characteristics over time was not found to be lower among ethnic minority children. To the contrary, particularly the ethnic composition of the neighborhood was found to be more stable over time among children from immigrant families than among native Dutch children. These findings are in line with previous research (Quillian, 2003; van Ham et al., 2014) suggesting that ethnic minority children have a stronger persistence of neighborhood disadvantage than children from the majority population.

In summary, this study showed that single point-in-time measures are reasonable proxies for the ethnic composition of children's neighborhood in the long run. Also among children who moved, we found moderately strong associations between the ethnic composition of the origin and destination neighborhood. With regard to the mean income of the neighborhood, however, point-in-time measures are less suitable proxies for children's long-run experiences. Especially among children who moved, the correlation between the mean income in the neighborhood in early childhood and that in adolescence is weak. This seems problematic as previous research indicates that exposure to neighborhood disadvantage is particularly harmful in early childhood (Anderson et al., 2014). We conclude that future research should pay more attention to the temporal conceptualization of children's neighborhood environment, especially with regard to neighborhood economic deprivation.

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