

Healthcare utilization profiles, facilitating resources, and continuity of care among transgender people in Brazil: A latent class analysis

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Abstract

Continuity of care among transgender populations remains insufficiently understood, particularly regarding how healthcare navigation influences sustained engagement with healthcare services. We aimed to identify healthcare navigation profiles derived from usual care-seeking channels and examine their association with continuity of care among transgender people in Brazil. We analyzed cross-sectional survey data from transgender people living in nine municipalities in São Paulo State, Brazil. Latent class analysis identified three healthcare navigation profiles: non-seeking, primary care, and emergency care. Compared with the non-seeking profile, participants in the primary care and emergency care profiles had substantially higher odds of continuity of care. In contrast, facilitating resources were not associated with continuity of care after adjustment for profile membership. These findings suggest that continuity of care is more strongly associated with healthcare navigation profiles than with individual facilitating resources, highlighting the importance of structural and healthcare system factors. Healthcare navigation profiles provide a useful framework for understanding continuity of care and may inform strategies to strengthen equitable and coordinated healthcare delivery for transgender populations.

Introduction

Transgender people experience persistent health inequalities despite the availability of universal healthcare systems. Structural stigma, institutional discrimination, and territorial inequalities continue to compromise healthcare access, continuity of care, and long-term engagement with health services. In Brazil, although the Unified Health System (SUS) guarantees universal healthcare, important inequities persist among socially marginalized populations, reflecting the interaction between structural social inequalities and the organization of healthcare services [1, 2].

Among populations situated in contexts of social exclusion, transgender people face additional barriers related to institutional discrimination, service organization, and limited support network. These barriers influence not only whether healthcare is sought, but also how individuals navigate different levels of care over time. Evidence indicates that, even in universal health systems, organizational barriers can limit the effectiveness of health policies in reducing health inequities by compromising equitable access and continuity of care [3, 4].

Although barriers to healthcare access among transgender populations are well documented, most studies have focused on individual-level determinants of service use, such as socioeconomic characteristics, perceived barriers, or facilitating resources. However, healthcare utilization reflects complex interactions between individuals and health systems that may not be adequately captured by isolated variables. While enabling resources and socioeconomic characteristics may facilitate access to healthcare, they do not necessarily explain whether care is maintained over time. Continuity of care also depends on the pathways through which individuals engage with the health system, including the points of entry, patterns of service utilization, and coordination across levels of care. Consequently, healthcare

navigation may represent a more proximal determinant of continuity of care than individual characteristics alone.

Healthcare navigation profiles provide a person-centered framework for understanding how individuals move through health systems. Rather than focusing on isolated determinants, these profiles capture the combined influence of individual behavior and health system organization, helping to explain why some individuals maintain continuity of care while others do not despite similar socioeconomic characteristics or enabling resources. Conceptually, healthcare navigation profiles and continuity of care represent distinct dimensions of healthcare engagement: navigation profiles reflect the structural pathways and entry points through which individuals access the health system (e.g., primary care, emergency care, or non-seeking behavior), whereas continuity of care reflects the maintenance of a stable and recurring relationship with a specific provider or service over time.

Even in universal health systems Although barriers to healthcare access among transgender populations have been widely documented, little is known about whether different healthcare utilization profiles are associated with continuity of care.

This study aimed to: (i) identify healthcare utilization profiles through latent classes based on usual source of care (USC) [5] and (ii) estimate the association of these profiles with the continuity of the care process among transgender people, additionally testing whether facilitating resources, such as participation in community networks, engagement in collective activities, income, and age, remain associated with continuity of care after accounting for healthcare utilization profiles.

Results

Healthcare navigation profiles

Latent class analysis identified three substantively meaningful healthcare navigation profiles (Fig. 1): (i) a non-seeking profile, characterized by endorsement of the “does not seek help” category and low probabilities of using other care channels; (ii) a primary care profile, characterized by predominant use of primary healthcare services; and (iii) an emergency care profile, characterized by predominant use of public emergency services.

Among the 199 participants included in the complete-case analyses, the emergency care profile was the largest subgroup, followed by the primary care and non-seeking profiles (see Supplementary Material, Table C).

Continuity of care

Continuity of care was defined as usually seeking the same place, professional, or healthcare service when healthcare was needed (N = 199). In the covariates-only model (Model 0), participation in

community support networks, health-promotion groups, income, and age showed no statistically robust associations with continuity of care (Supplementary Material, Tables D and E).

After adjustment for healthcare navigation profiles (Model 1), profile membership was strongly associated with continuity of care (Table 1). Compared with the non-seeking profile, respondents in the primary care profile had substantially higher odds of reporting continuity of care (OR = 7.93, 95% CI 2.49–29.2, $p < .001$), as did those in the emergency care profile (OR = 5.77, 95% CI 2.38–14.4, $p < .001$). In contrast, community support network participation, health-promotion group participation, income, and age remained unrelated to continuity of care after adjustment. Overall, continuity of care was more strongly associated with healthcare navigation profiles than with the enabling resources examined.

Latent class structure of healthcare navigation profiles (LCA):

To examine latent healthcare navigation profiles, we estimated latent class models using six binary indicators derived from the multi-select item on respondents' usual care-seeking channels when sick or in need of care (B02): specialized outpatient services, primary care, public emergency care, pharmacy, informal/trusted person/other, and "does not seek help." Before modeling, response patterns with no channel selected (all-zero patterns) were excluded to avoid conflating item non-marking with substantive non-use. In addition, the "does not seek help" category was specified as mutually exclusive; when endorsed, all remaining care-seeking channels were re-coded as 0.

Models with two to four latent classes ($K = 2-4$) were estimated and compared using the Akaike Information Criterion (AIC), Bayesian Information Criterion (BIC), and classification diagnostics.

Classification diagnostics indicated strong class separation, with high entropy and posterior probabilities. The resulting classes should be interpreted as distinct healthcare navigation profiles.

Class profiles and substantive interpretation:

Three healthcare navigation profiles were identified: non-seeking, primary care, and emergency care (Fig. 1). Additional class characteristics and profile distributions are reported (Supplementary Material, Tables D and E).

Usual source of care: covariates-only versus profile-adjusted models

Usual source of care was modeled as a binary outcome indicating whether respondents usually sought the same place, professional, or healthcare service when care was needed ($N = 199$). Model 0 included community support network participation, health-promotion group participation, income, and age. Model 1 additionally included healthcare navigation profile membership, using the non-seeking profile as the reference category.

In Model 0, none of the covariates were associated with usual source of care (Supplementary Material, Table E). In Model 1, healthcare navigation profile membership was strongly associated with continuity

of care (Table 1). Compared with the non-seeking profile, respondents in the primary care profile had higher odds of reporting continuity of care (OR = 7.93, 95% CI 2.49–29.2, $p < .001$), as did those in the emergency care profile (OR = 5.77, 95% CI 2.38–14.4, $p < .001$).

Table 1
Logistic regression model for continuity of care according to healthcare navigation profiles and covariates

Predictor	β (log-odds)	SE	z	OR (95% CI)	pvalue
Healthcare navigation profile: Primary care vs non-seeking	2.071	0.619	3.340	7.93 [2.49, 29.2]	< .001
Healthcare navigation profile: Emergency care vs non-seeking	1.753	0.456	3.840	5.77 [2.38, 14.4]	< .001
Trans support network participation (yes)	-0.174	0.372	-0.467	0.84 [0.40, 1.75]	0.640
Health-promotion group participation (yes)	-0.273	0.419	-0.653	0.76 [0.34, 1.78]	0.514
Has any income (yes)	0.254	0.391	0.651	1.29 [0.59, 2.78]	0.515
Age (years)	0.030	0.024	1.330	1.03 [0.99, 1.09]	0.184
Note: N = 199. OR, odds ratio; CI, confidence interval. The non-seeking profile was used as the reference category.					

After adjustment for healthcare navigation profiles, participation in community support networks, health-promotion groups, income, and age were not associated with continuity of care. Overall, continuity of care appeared more strongly related to healthcare navigation profiles than to the enabling resources examined.

Healthcare navigation profile membership

Multinomial logistic regression showed no evidence that community support network participation, health-promotion group participation, income, or age predicted profile membership (Table 2). These findings suggest that healthcare navigation profiles may be shaped by unmeasured structural factors, including service availability, discrimination, geographic constraints, and institutional barriers (Supplementary Material, Tables F and G).

Table 2. Multinomial model predicting profile membership

Comparison	Predictor	β	SE	z	pvalue	RRR
Primary care (UBS) vs non-seeking	Trans support network participation (yes)	0.501	0.513	0.976	0.329	1.650
	Health-promotion group participation (yes)	-0.006	0.578	-0.010	0.992	0.994
	Has any income (yes)	-0.387	0.572	-0.676	0.499	0.679
	Age (years)	0.006	0.027	0.234	0.815	1.006
Emergency (UPA) vs non-seeking	Trans support network participation (yes)	0.644	0.436	1.476	0.140	1.904
	Health-promotion group participation (yes)	-0.115	0.491	-0.234	0.815	0.892
	Has any income (yes)	-0.562	0.486	-1.158	0.247	0.570
	Age (years)	-0.015	0.023	-0.649	0.516	0.985

Note: Model fit: residual deviance = 342.94; AIC = 362.94.

Exploratory interaction analyses

No evidence of age-by-profile interaction was observed ($p = .81$ and $p = .84$). For income, a positive association with continuity of care was observed in the non-seeking profile ($p = .076$), but was attenuated in the primary care and emergency care profiles (interaction $p = .088$ and $p = .108$).

As shown in Figure 2, continuity of care remained high in the primary care and emergency care profiles across income levels but was lower in the non-seeking profile, particularly among participants without income. Given the small size of some classes, these findings should be considered exploratory.

Discussion

This study examined how healthcare navigation profiles and facilitating resources were associated with continuity of care among transgender people in Brazil. Three empirically distinct healthcare navigation profiles were identified, and profile membership emerged as the factor most strongly associated with continuity of care. In contrast, the facilitating resources included in the analysis, participation in community support networks, engagement in health-promotion groups, income, and age, were not independently associated with continuity of care after adjustment for profile membership.

These findings suggest that continuity of care among transgender people may depend less on individual enabling resources than on interactions with the healthcare system over time. The lack of association between enabling resources and continuity of care suggests that social participation and socioeconomic conditions alone do not explain how transgender people engage with the Brazilian health system. Instead, our findings suggest the importance of structural and institutional factors—including service

distribution, care-network organization, discrimination, administrative barriers, and service responsiveness—on continuity of care.

In interpreting these findings, it is essential to emphasize that healthcare navigation profiles and continuity of care capture distinct dimensions of health system interaction. Demonstrating high reliance on a specific care channel, such as emergency services, does not inherently imply longitudinal or relationally integrated care. Instead, our results reveal that primary care pathways facilitate systemic integration and true relational continuity, whereas heavy reliance on emergency care or non-seeking patterns reflects fragmented access, even when individuals report a recurrent point of contact.

This interpretation is consistent with previous research showing that negative healthcare experiences, institutional exclusion, and limited access to culturally competent services may discourage long-term engagement with healthcare systems and compromise continuity of care among transgender populations [6]. Taken together, these findings reinforce the view that healthcare navigation patterns are not solely determined by individual choices but are also shaped by the organization of health systems and their capacity to provide coordinated, accessible, and inclusive care pathways for socially marginalized populations.

From a policy perspective, these findings reinforce the importance of strengthening primary healthcare and improving coordination across levels of care. Continuity of care may depend not only on expanding service availability but also on reducing institutional barriers that influence how transgender people access and navigate healthcare systems. Our findings suggest that healthcare navigation profiles may serve as indicators of how health systems succeed—or fail—in creating stable pathways of engagement with care.

Continuity of care represents a critical dimension of healthcare performance, particularly within universal systems committed to equity and comprehensive care. Fragmented healthcare pathways, territorial disparities in service availability, and insufficient integration across levels of care may disproportionately affect populations experiencing structural vulnerability. As argued by Sutherland (2021), fragmented systems tend to compromise coordination and continuity of care, thereby reinforcing inequities in healthcare access and health outcomes. Among transgender populations, these dynamics may further intensify barriers to healthcare utilization and long-term engagement with healthcare services [7].

In this context, our findings highlight the importance of accessible, responsive, and inclusive primary healthcare in supporting more stable healthcare navigation patterns and promoting continuity of care [8]. They also reinforce the central role of primary care as the coordinating level of care within the Brazilian Unified Health System (SUS), particularly for populations exposed to multiple forms of social vulnerability. Exploratory interaction analyses further suggested that income may be more relevant among individuals outside stable engagement with formal healthcare services, whereas continuity of care among respondents already integrated into primary care or emergency care profiles appeared less sensitive to socioeconomic differences [9–11]. This finding is consistent with broader evidence

indicating that social determinants may influence healthcare access and engagement among sexual and gender minority populations [10].

Although these findings should be interpreted cautiously, they are consistent with the hypothesis that institutional integration into healthcare systems may partially buffer the effects of socioeconomic disadvantage on continuity of care.

The person-centered approach adopted through latent class analysis allowed healthcare navigation to be examined as integrated patterns rather than isolated indicators of healthcare use. This approach may better capture how transgender people interact with healthcare systems and may explain why healthcare navigation profiles showed stronger associations with continuity of care than the individual facilitating resources evaluated in this study.

Taken together, these findings support a structural interpretation of health inequalities affecting transgender populations. Persistent exclusion from formal employment and associated social protection, discrimination within healthcare services, administrative barriers, inadequate professional training, and restricted access to gender-affirming care may contribute to fragmented healthcare navigation pathways and lower continuity of care [12, 13, 14]. These challenges are further reinforced by persistent uncertainty regarding access to gender-affirming procedures and gender-related stigma, which continue to shape healthcare navigation. Consequently, improving continuity of care among transgender populations requires not only healthcare reforms but also intersectoral policies that address social inclusion, labor market participation, social protection, and the organization of healthcare services.

Recent policy developments related to the *Programa de Atenção Especializada à Saúde da População Trans (PAES-Pop Trans)* highlight the growing recognition that reducing health inequities among transgender people requires coordinated and comprehensive models of care rather than isolated services. PAES-Pop Trans was proposed as a strategy to strengthen the organization and coordination of care and territorial access for transgender populations within the Brazilian Unified Health System (SUS) [15, 16]. Although the present study did not evaluate the implementation of this program, our findings are consistent with its underlying rationale, suggesting that coordinated healthcare pathways may play an important role in promoting continuity of care. In this context, challenges and uncertainties surrounding the implementation of PAES-Pop may limit its potential to address fragmented care pathways, territorial inequalities, and barriers to accessing both gender-affirming and general healthcare services, with potential implications for continuity of care among transgender populations [15].

Currently, Brazil faces important challenges in strengthening inclusive Primary Health Care (PHC) for transgender populations, despite the existence of multiple national health equity policies. In our study, participants classified in the primary care profile showed substantially higher odds of continuity of care compared with those in the non-seeking profile (OR = 7.93, 95% CI [2.49, 29.2]), while respondents in the emergency care profile also demonstrated higher odds of continuity (OR = 5.77, 95% CI [2.38, 14.4]).

These findings suggest that continuity of care is closely linked to stable healthcare utilization patterns and the existence of structured entry points into the health system.

From a policy perspective, strengthening inclusive and culturally competent primary healthcare may represent one of the most effective strategies for reducing health inequities among transgender populations. Accessible PHC services can improve care coordination, facilitate access to gender-affirming services, and promote long-term engagement with healthcare systems. However, Brazilian health expenditures remain disproportionately concentrated in specialized and hospital-based care, while investments in primary care and workforce development remain comparatively limited [16–18].

The predominance of the emergency-oriented profile in our sample may signal weaknesses in the capacity of healthcare systems to establish continuous and coordinated care pathways through primary care. Previous studies have shown that stronger PHC systems are associated with fewer avoidable hospitalizations, better care coordination, and improved health system performance [17, 19–22]. These findings reinforce the importance of strengthening primary healthcare to improve continuity of care and reduce health inequities among transgender populations.

The findings suggest that health policies alone may be insufficient to address the mechanisms generating health inequalities among transgender populations. Continuity of care is embedded within broader systems of social protection, labor market participation, and economic inclusion. Consequently, policies aimed at strengthening healthcare services should be complemented by measures that promote formal employment, income security, and access to contributory social protection. National evidence indicates that discrimination, school dropout associated with transphobia, institutional violence, and occupational segmentation disproportionately push transgender people into informal and precarious forms of employment, characterized by low social security coverage and limited access to social protection [12]. This exclusion may limit access to contributory social protection, including pensions, sick pay, and disability benefits, while also restricting the economic conditions that support sustained engagement with healthcare services. These findings are consistent with the broader literature identifying labor market exclusion as an important structural determinant of health inequalities among transgender populations. Comparative evidence suggests that employment protection and opportunities for formal labor market integration may contribute to greater employment stability and reduce economic vulnerability [9, 11]. Together, these findings underscore the importance of intersectoral approaches linking healthcare reforms with broader policies that promote social inclusion and economic participation [9, 11].

Overall, our findings indicate that healthcare navigation profiles provide a meaningful framework for understanding continuity of care among transgender populations. By integrating patterns of care-seeking behavior into person-centered profiles, this approach captures dimensions of healthcare engagement that are not explained by facilitating resources alone. These findings support the use of healthcare navigation profiles as a promising analytical framework for investigating continuity of care in populations exposed to structural vulnerability.

Methods

Data structure and collection

The data analyzed are derived from the project “Mapping the Transgender Population of the State of São Paulo: Metropolitan Region of Baixada Santista,” conducted in the nine municipalities of the region through a cross-sectional quantitative survey carried out between July and November 2023.

The study was approved by the Research Ethics Committee of the São Paulo State Department of Health (CAAE 64010722.8.0000.5375; Opinion No. 6,242,582; approved on 16 August 2023). The São Paulo State Department of Health was the institution responsible for the ethical review and approval of the study and is therefore identified here in this capacity, rather than as an institutional affiliation of the authors. All methods were carried out in accordance with relevant guidelines and regulations and with the Declaration of Helsinki. Informed consent was obtained from all participants prior to data collection.

The target population included people who self-identified as transgender, transvestite, or non-binary, aged 18 or older, who reported residing, studying, or working in municipalities of Baixada Santista during the study period. The recruitment strategy was non-probabilistic by convenience, adequate to the context of a population frequently characterized as “difficult to access”/underrepresented in general surveys, although it imposes known limitations on population inference and the generalization of the findings.

Participation was voluntary and anonymous, and eligibility items were embedded at the beginning of the instrument to ensure that the analytic sample comprised respondents who self-identified as trans* and reported residing, working, or studying in municipalities within the *Baixada Santista* region. Following standard practices for survey-based observational research, the dataset was treated as cross-sectional and analyzed accordingly [23, 24].

Data collection was carried out after the signing of the Informed Consent Form (ICF), a mandatory document in research involving human subjects in Brazil. The interview was conducted in a confidential environment by previously trained transgender individuals, as a strategy to strengthen acceptability and reduce relational barriers during the interview. Responses were recorded directly in an electronic form on the Research Electronic Data Capture (REDCap) platform, allowing for standardized capture, structured storage, and traceability of instrument versions.

The questionnaire was administered in Brazilian Portuguese and structured to capture: (i) sociodemographic characteristics; (ii) socioeconomic conditions; (iii) participation in community networks and collective activities; and (iv) patterns of healthcare navigation, both for general health needs and for needs related to gender transition processes. The instrument combined original items and adapted measures previously used in research and healthcare contexts, including well-being measures [25] and items for screening alcohol consumption based on widely used clinical guidelines (Supplementary Material – Table A)

This cross-sectional survey included trans* individuals residing, working, or studying in municipalities of the Baixada Santista region, São Paulo, Brazil. Sample size was estimated by applying a prevalence of 1.88% [9] to the adult population, resulting in an estimated population of 19,965 people. Assuming a 5% margin of error and design effect = 1, the target sample was 377 participants. Due to recruitment barriers and operational limitations, 237 eligible respondents were included in the final analytic sample. Sample characteristics are presented in Supplementary Material (Table A).

The sample spans multiple municipalities in the Baixada Santista region, enabling examination of territorial heterogeneity in healthcare navigation. The analysis focused on continuity of care, healthcare utilization, and usual care-seeking channels among transgender people. Participation in trans support networks and collective activities was the main explanatory factor, while sociodemographic and socioeconomic variables were included as covariates. Operational definitions and coding are presented in Supplementary Material (Table B).

Latent class analysis (LCA) and regression models were used to: (i) identify healthcare navigation profiles based on care-seeking patterns; and (ii) examine whether profile membership and enabling resources (community networks, collective activities, income, and age) were associated with continuity of care. Analyses were conducted in R using the *poLCA* package and generalized linear models [24, 26]. Continuity of care was coded as a binary outcome (1 = Yes, 0 = No), with other responses treated as missing [27]. Before LCA, all-zero response patterns were excluded, and "does not seek help" responses were coded as mutually exclusive, defining a distinct navigation profile [28].

Latent Class Analysis (LCA) to derive healthcare navigation profiles:

We estimated latent class analysis (LCA) models using binary indicators of care-seeking channels to identify distinct healthcare navigation profiles. LCA was used to identify healthcare navigation profiles based on binary indicators of care-seeking channels [28, 29]. Models were estimated by maximum likelihood using the expectation-maximization (EM) algorithm implemented in the *poLCA* package for R [26].

The primary outcome was continuity of care, defined as whether respondents usually sought the same healthcare service or professional when healthcare was needed. We examined whether healthcare navigation profiles and enabling resources (community networks, collective activities, income, and age) were associated with continuity of care.

Because the study was cross-sectional, classes were interpreted as healthcare navigation profiles rather than longitudinal trajectories. The preferred solution identified three profiles: (i) Non-seeking; (ii) Primary care; and (iii) Emergency care.

Models with $K = 2$ to $K = 4$ classes were estimated and compared using the Akaike Information Criterion (AIC) and Bayesian Information Criterion (BIC), balancing model fit and parsimony [30, 31]. Entropy and

average maximum posterior probabilities were also examined to assess classification quality [32, 33]. Multiple random starts were used to minimize local maxima [26].

Participants were assigned to classes using the maximum a posteriori rule [28, 33]. Latent classes were interpreted and labeled according to the care-seeking channels with the highest conditional response probabilities [28].

Model 0 included trans support network participation, health-promotion groups, income, and age, whereas Model 1 additionally included healthcare navigation profile membership, using the non-seeking profile as the reference category. Results are reported as odds ratios (ORs) and 95% confidence intervals (CIs) [23, 24].

Associations between enabling resources and healthcare navigation profiles were examined using multinomial logistic regression, with results reported as relative risk ratios (RRRs) [34].

Exploratory models additionally tested profile $\times$ income and profile $\times$ age interactions.

Conclusion

This study demonstrates that continuity of care among transgender people in the Baixada Santista region of São Paulo State, Brazil, is more strongly associated with healthcare navigation profiles than with the individual enabling resources examined in this study. Participants connected to primary care and emergency care pathways were substantially more likely to report continuity of care than those classified in the non-seeking profile, highlighting the importance of stable pathways of engagement with healthcare services.

The findings suggest that continuity of care is shaped not only by individual circumstances but also by structural and institutional factors, including healthcare organization, access to inclusive primary care, social protection, and experiences of discrimination. Strengthening inclusive primary healthcare, improving care coordination, and reducing barriers to healthcare access may therefore play an important role in promoting continuity of care among transgender populations.

Ultimately, reducing inequalities in continuity of care will require coordinated action across the health and social sectors. In this sense, continuity of care should be understood not only as an individual healthcare outcome but also as an indicator of health system performance, inclusiveness, and responsiveness to the needs of structurally marginalized populations.

Limitations:

This study has limitations that should guide the interpretation of the findings. First, the cross-sectional design precludes establishing temporal ordering and prevents causal inferences between healthcare navigation profiles and continuity of care. Consequently, the observed associations should be interpreted as descriptive.

Second, the use of non-probabilistic sampling, although appropriate for hard-to-reach populations, limits the generalizability of the findings. The sample reflects the experiences of participants recruited in this study and should not be considered representative of the broader transgender population.

Third, unmeasured structural factors—including territorial characteristics, geographic accessibility, quality of care, and experiences of discrimination—may have influenced both healthcare navigation profiles and continuity of care. In addition, the profiles were derived from self-reported care-seeking behaviors and may therefore be subject to recall and reporting biases.

Because the latent profiles were derived from reported usual care-seeking channels, some conceptual overlap with the continuity-of-care outcome cannot be excluded. This should be considered when interpreting the observed associations between profile membership and continuity of care.

Finally, latent class analysis identifies empirically derived groups based on observed response patterns, and alternative class structures may be plausible in different populations or settings. Future longitudinal studies, including approaches for hard-to-reach populations such as Starfish Sampling, may clarify relationships among healthcare navigation, continuity of care, labor market participation, social protection, and health outcomes among transgender populations.

Declarations

Data Availability

The datasets generated and/or analyzed during the current study are not publicly available because they contain sensitive information that could compromise participant confidentiality. De-identified data may be made available from the corresponding author upon reasonable request and subject to approval by the responsible Research Ethics Committee and applicable institutional and legal requirements.

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Author Contributions

L.F.Z.N. conceived and designed the present study, coordinated the project, conducted the statistical analyses, interpreted the data, drafted the original manuscript, and revised the final version. C.G.L. and F.M.S. contributed to the study methodology and critically revised the manuscript. M.L.C.M., L.V.P.E., G.F.C. and P. A. S. critically revised the manuscript and contributed to the interpretation of the findings. B.I.L.B. supervised the overall research project, contributed to the study design and interpretation of the findings, critically revised the manuscript, and approved the final version. All authors read and approved the final manuscript.

Competing Interests

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this manuscript.

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References

1. Souza, J. S. et al. Users' perceptions of access to and quality of Unified Health System services in Brazil: a cross-sectional study and implications to healthcare management challenges. *Int. J. Environ. Res. Public. Health*. **21**, 721. <https://doi.org/10.3390/ijerph21060721> (2024).
2. Freitas, F. L. S., Bermúdez, X. P. C. D., Merchán-Hamann, E., Dias Dos Santos, A. S. & Vieira, V. F. Social and programmatic vulnerability in the context of transgender people's health: a scoping review of scientific evidence from Brazil. *Int. J. Equity Health*. **23**, 272. <https://doi.org/10.1186/s12939-024-02359-1> (2024).
3. Castro, M. C. et al. Brazil's unified health system: the first 30 years and prospects for the future. *Lancet* **394**, 345–356. [https://doi.org/10.1016/S0140-6736\(19\)31243-7](https://doi.org/10.1016/S0140-6736(19)31243-7) (2019).
4. Roman, A. A closer look into Brazil's healthcare system: what can we learn? *Cureus* **15**, e38390 (2023). <https://doi.org/10.7759/cureus.38390>
5. Dourado, I., Medina, M. G. & Aquino, R. The effect of the Family Health Strategy on usual source of care in Brazil: data from the 2013 National Health Survey (PNS 2013). *Int. J. Equity Health*. **15**, 151. <https://doi.org/10.1186/s12939-016-0440-7> (2016).
6. Goldenberg, T., Kahle, E. M. & Stephenson, R. Stigma, resilience, and health care use among transgender and other gender diverse youth in the United States. *Transgend Health*. **5**, 173–181. <https://doi.org/10.1089/trgh.2019.0074> (2020).
7. Sutherland, J. M. Health care funding policies for reducing fragmentation and improving health outcomes. *SPP Res. Papers*. **14**, 1–26 (2021). <https://ssrn.com/abstract=4090964>
8. Ahmed, S. B., Beach, L. B., Safer, J. D., Veale, J. F. & Whitley, C. T. Considerations in the care of transgender persons. *Nat. Rev. Nephrol.* **19**, 360–365. <https://doi.org/10.1038/s41581-023-00713-0> (2023).

9. Carranza, R., Prieto, J. & Sehnbruch, K. Job loss and earnings inequality: distributional effects of formal re-employment in Chile. *Econ. Anal. Policy*. **86**, 1020–1036. <https://doi.org/10.1016/j.eap.2025.02.021> (2025).
10. Zhang, A. et al. Social determinants of health as risk and protective factors for health care access among sexual and gender minority parents. *Sci. Rep.* **16**, 15966. <https://doi.org/10.1038/s41598-026-43114-6> (2026).
11. Takeuchi, M. The impact of employment protection reform on the working conditions of fixed-term employees in Japan. *Econ. Anal. Policy*. **89**, 1191–1217. <https://doi.org/10.1016/j.eap.2025.11.017> (2026).
12. Silva, M. A., Luppi, C. G. & Veras, M. A. S. M. Work and health issues of the transgender population: factors associated with entering the labor market in the state of São Paulo, Brazil. *Cien Saude Colet.* **25**, 1723–1734. <https://doi.org/10.1590/1413-81232020255.33082019> (2020).
13. Costa, D. Transgender health between barriers: a scoping review and integrated strategies. *Societies* **13**, 125. <https://doi.org/10.3390/soc13050125> (2023).
14. Gonçalves, L. M., de Bonetti, S. R., Cortes, N. M., Glass, H., Soares, L. & B. D. & Access to healthcare for trans, travestis, and gender-diverse people in Latin America: a scoping review. *Front. Public. Health.* **13**, 1710952. <https://doi.org/10.3389/fpubh.2025.1710952> (2025).
15. Teixeira, F. B., Rodrigues, J. S., Cavadinha, E. T., Rodrigues, S. M. & Magalhães Júnior, H. M. Between territory and management: building bridges to develop a Specialized Health Care Program for the Trans Population. *Interface* **29**, e240520. <https://doi.org/10.1590/interface.250382> (2025).
16. Nunes Marinho, L. et al. Public health financing in Brazil (2019–2022): an analysis of the national health fund and implications for health management. *Front. Public. Health.* **13**, 1568351. <https://doi.org/10.3389/fpubh.2025.1568351> (2025).
17. Freitas, B. L., de Antiga, M. L., Sarti, F. M. & O. C. & Effects of primary healthcare quality and effectiveness on hospitalization indicators in Brazil. *J. Mark. Access. Health Policy.* **13**, 21. <https://doi.org/10.3390/jmahp13020021> (2025).
18. Prefeitura do Município de São Paulo. Protocolos e Documentos Técnicos LGBTIA+. Secretaria Municipal da Saúde https://prefeitura.sp.gov.br/web/saude/w/atencao_basica/317448 (2026). accessed 15 July 2026).
19. Huber, C. A., Scherer, M., Rapold, R. & Blozik, E. Evidence-based quality indicators for primary healthcare in association with the risk of hospitalisation: a population-based cohort study in Switzerland. *BMJ Open.* **10**, e032700. <https://doi.org/10.1136/bmjopen-2019-032700> (2020).
20. Jeffreys, M. et al. Consequences of barriers to primary health care for children in Aotearoa New Zealand. *SSM Popul. Health.* **17**, 101044. <https://doi.org/10.1016/j.ssmph.2022.101044> (2022).
21. Sawicki, O. A. et al. Strong and sustainable primary healthcare is associated with a lower risk of hospitalization in high risk patients. *Sci. Rep.* **11**, 4349. <https://doi.org/10.1038/s41598-021-83962-y> (2021).

22. Zhou, M., Liao, J., Hu, N. & Kuang, L. Association between primary healthcare and medical expenditures in a context of hospital-oriented healthcare system in China: a national panel dataset, 2012–2016. *Int. J. Environ. Res. Public. Health*. **17**, 6917. <https://doi.org/10.3390/ijerph17186917> (2020).
23. Agresti, A. *Categorical Data Analysis* 3rd edn (Wiley, 2013).
24. Hosmer, D. W. Jr., Lemeshow, S. & Sturdivant, R. X. *Applied Logistic Regression* 3rd edn (Wiley, 2013). <https://doi.org/10.1002/9781118548387>
25. Sischka, P. E., Costa, A. P., Steffgen, G. & Schmidt, A. F. The WHO-5 well-being index – validation based on item response theory and the analysis of measurement invariance across 35 countries. *J. Affect. Disord Rep.* **1**, 100020. <https://doi.org/10.1016/j.jadr.2020.100020> (2020).
26. Linzer, D. A. & Lewis, J. B. polCA: an R package for polytomous variable latent class analysis. *J. Stat. Softw.* **42**, 1–29. <https://doi.org/10.18637/jss.v042.i10> (2011).
27. Little, R. J. A. & Rubin, D. B. *Statistical Analysis with Missing Data* 3rd edn (Wiley, 2019). <https://doi.org/10.1002/9781119482260>
28. Collins, L. M. & Lanza, S. T. *Latent Class and Latent Transition Analysis: With Applications in the Social, Behavioral, and Health Sciences* (Wiley, 2010). <https://doi.org/10.1002/9780470567333>
29. Lazarsfeld, P. F. & Henry, N. W. *Latent Structure Analysis* (Houghton Mifflin, (1968).
30. Akaike, H. A new look at the statistical model identification. *IEEE Trans. Automat Control*. **19**, 716–723. <https://doi.org/10.1109/TAC.1974.1100705> (1974).
31. Schwarz, G. Estimating the dimension of a model. *Ann. Stat.* **6**, 461–464. <https://doi.org/10.1214/aos/1176344136> (1978).
32. Celeux, G. & Soromenho, G. An entropy criterion for assessing the number of clusters in a mixture model. *J. Classif.* **13**, 195–212. <https://doi.org/10.1007/BF01246098> (1996).
33. Nagin, D. S. *Group-Based Modeling of Development* (Harvard University Press, 2005). <https://doi.org/10.4159/9780674041318>
34. Venables, W. N. & Ripley, B. D. *Modern Applied Statistics with S* 4th edn (Springer, 2002). <https://doi.org/10.1007/978-0-387-21706-2>

Figures

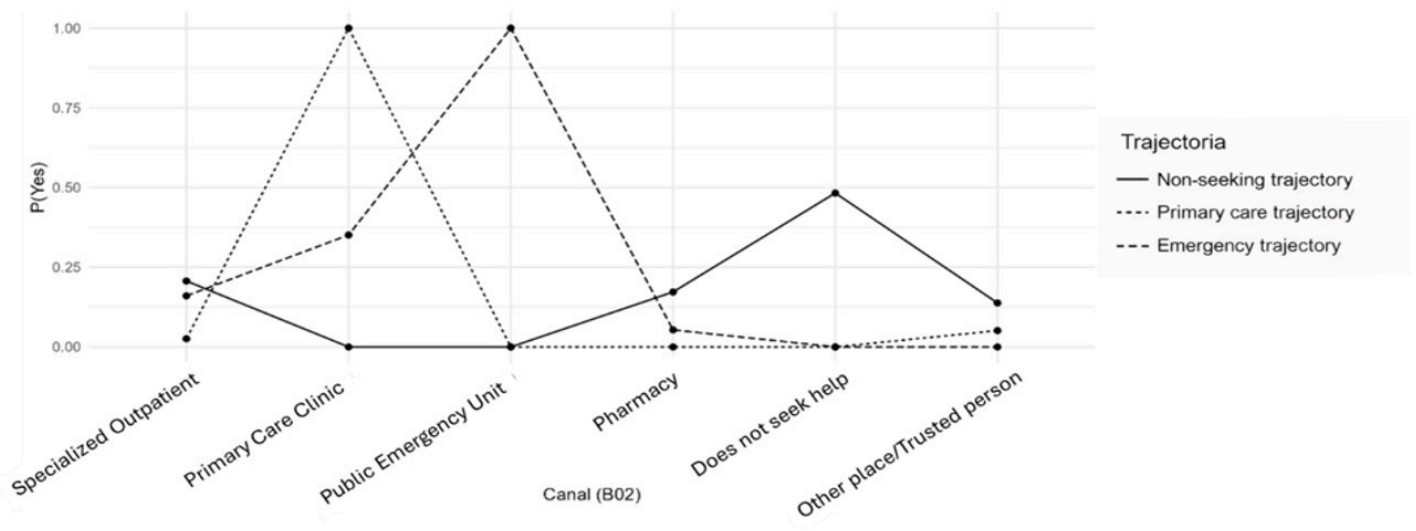


Figure 1

Healthcare navigation Profiles (LCA classes)– Probability of selecting each channel

Note: Healthcare navigation profiles identified by latent class analysis among transgender people in Brazil. Conditional probabilities of endorsement for each usual care-seeking channel are presented for the three latent profiles.

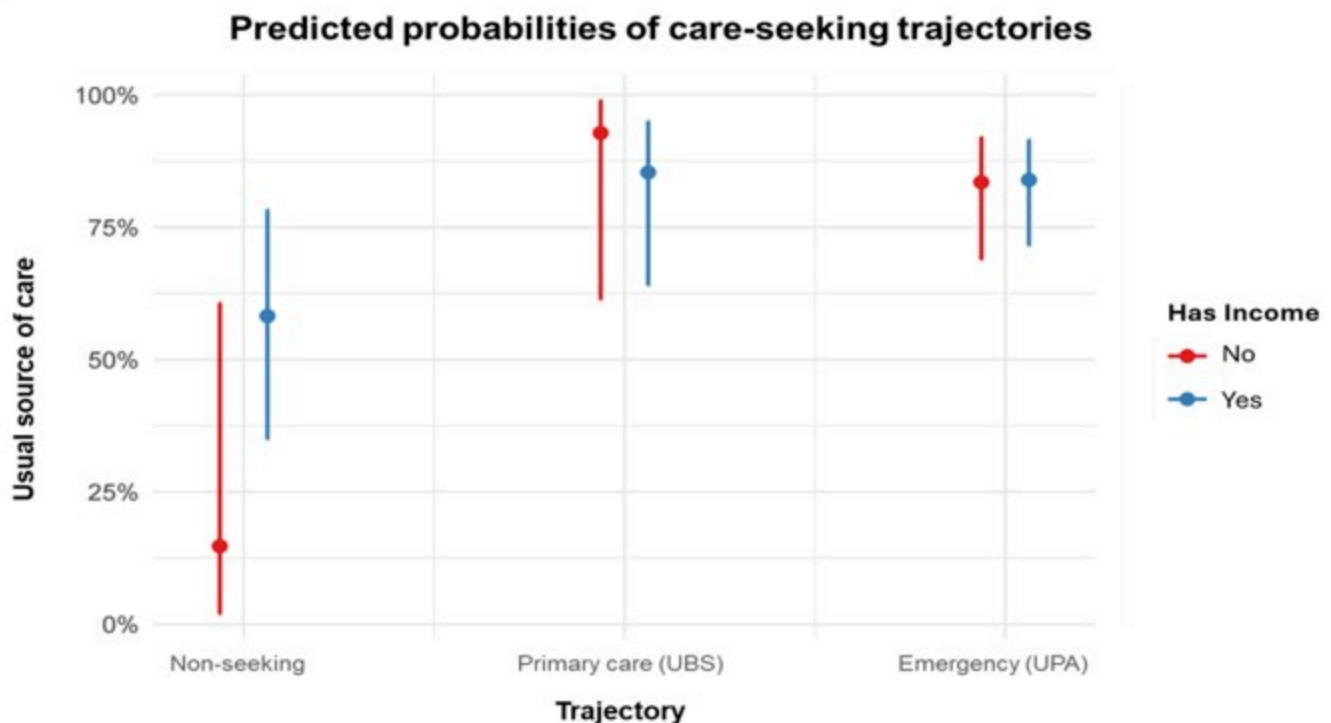


Figure 2

Continuity of care by healthcare navigation profile and income status.

Note: Predicted probabilities of continuity of care according to healthcare navigation profile and income status. Predicted probabilities were estimated from the adjusted interaction model. Error bars represent 95% confidence intervals.

Supplementary Files

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