

# Systematic Mapping of Multilevel Factors Contributing to Dental Caries in Adolescents

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# ┌ Agenda

INTRO

LITERATURE  
REVIEW

CAUSAL  
LOOP  
DIAGRAM

DISCUSSION



# Introduction



# Problem Statement

A young woman with dark hair is lying back in a dental chair, smiling. A dentist wearing blue gloves is using a dental mirror to examine her teeth. The background is a bright, clean dental office.

Dental caries is:

- A complex chronic disease affected by multi-level factors.
- The 4th most expensive disease to treat (according to WHO).
- Highly prevalent among adolescents (12-19 years old) specially those from low-income families.

# Dental caries over time

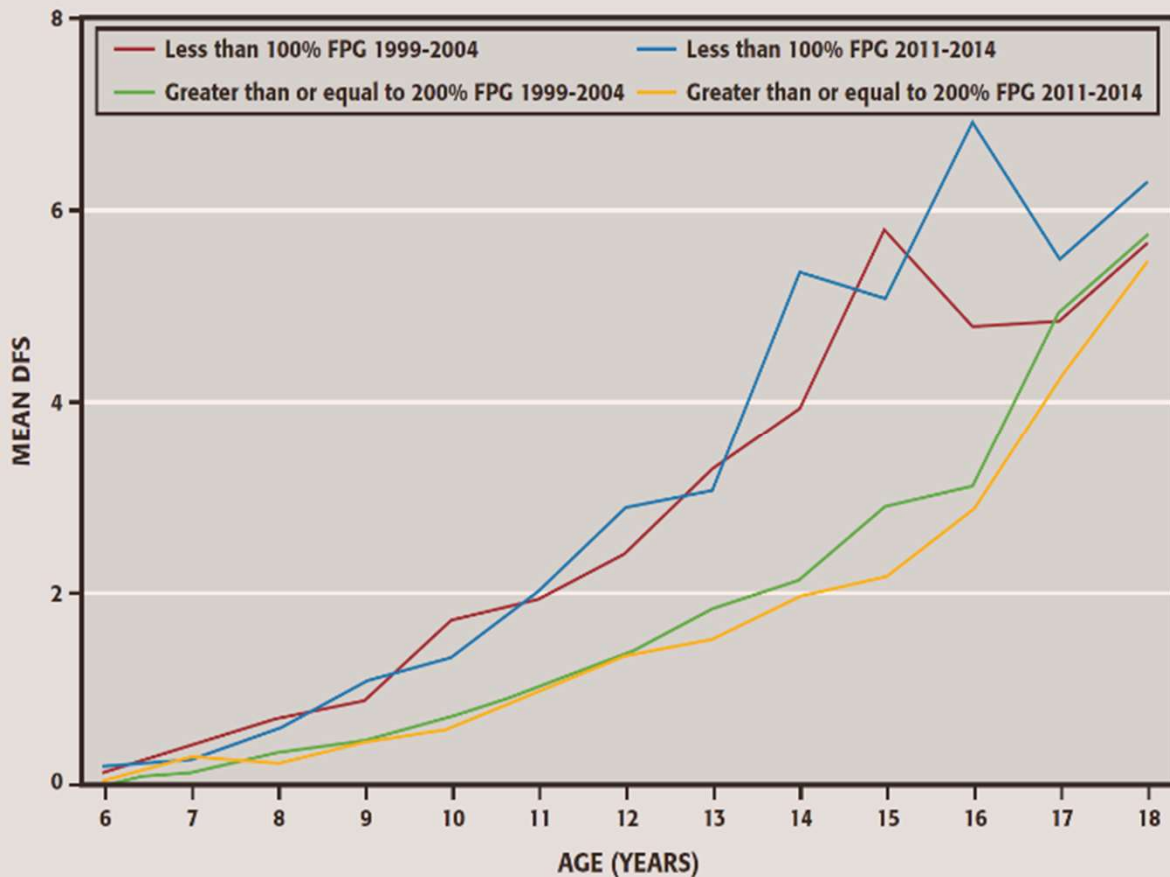
Adolescents' dental caries percentage In U.S. 2011-2014:

**58%**

- Higher prevalence for those in low-income families (66%)

Dental caries of low-income families in 2011-2014 vs 1999-2004:

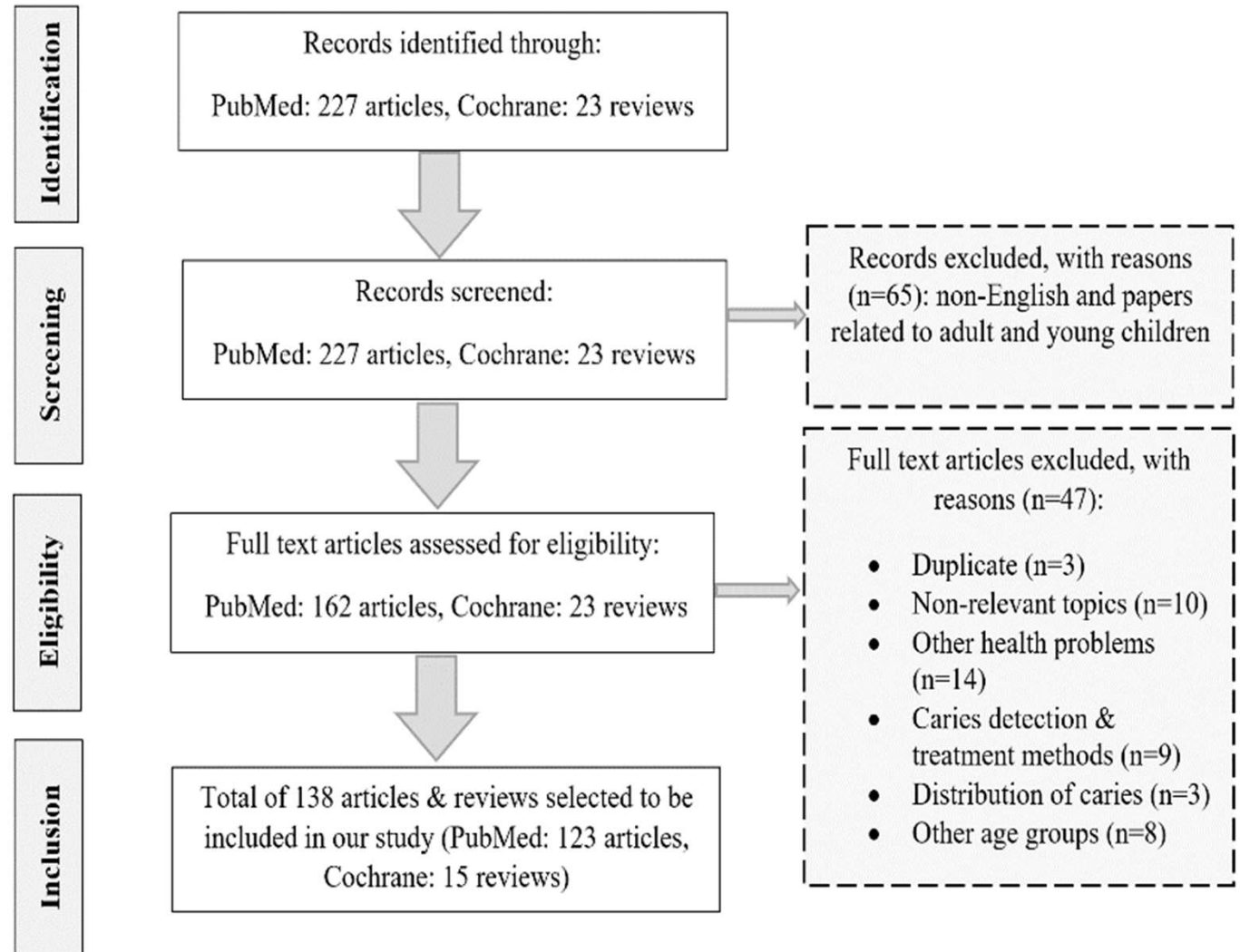
- Declined by 6.8% and 4.4% for children aged 2-5 and 6-11
- Declined **only by 0.2%** for adolescents



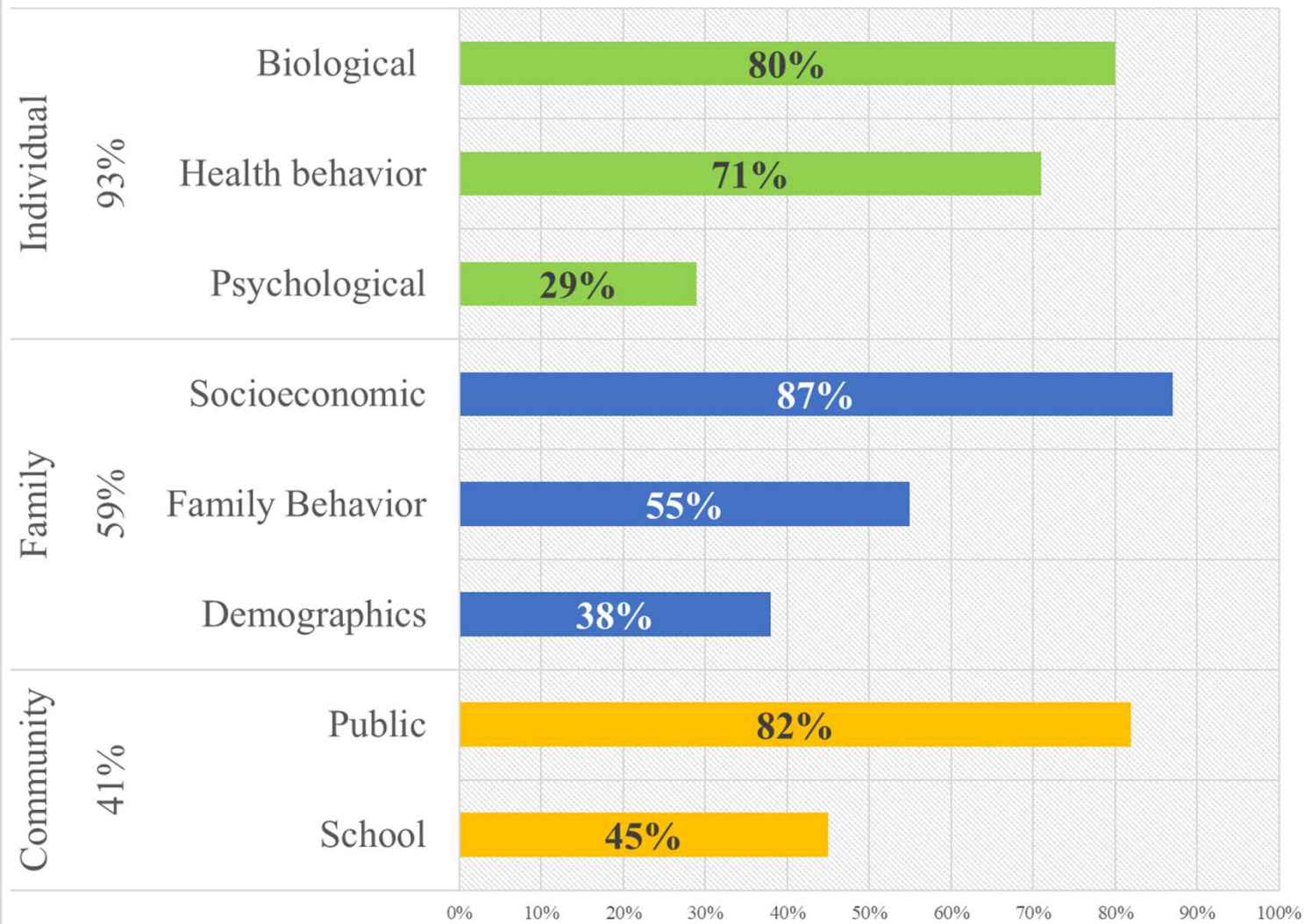
# Literature Review



# Flow Diagram of literature review process



## Multi-level factors



## Multi Level Factors

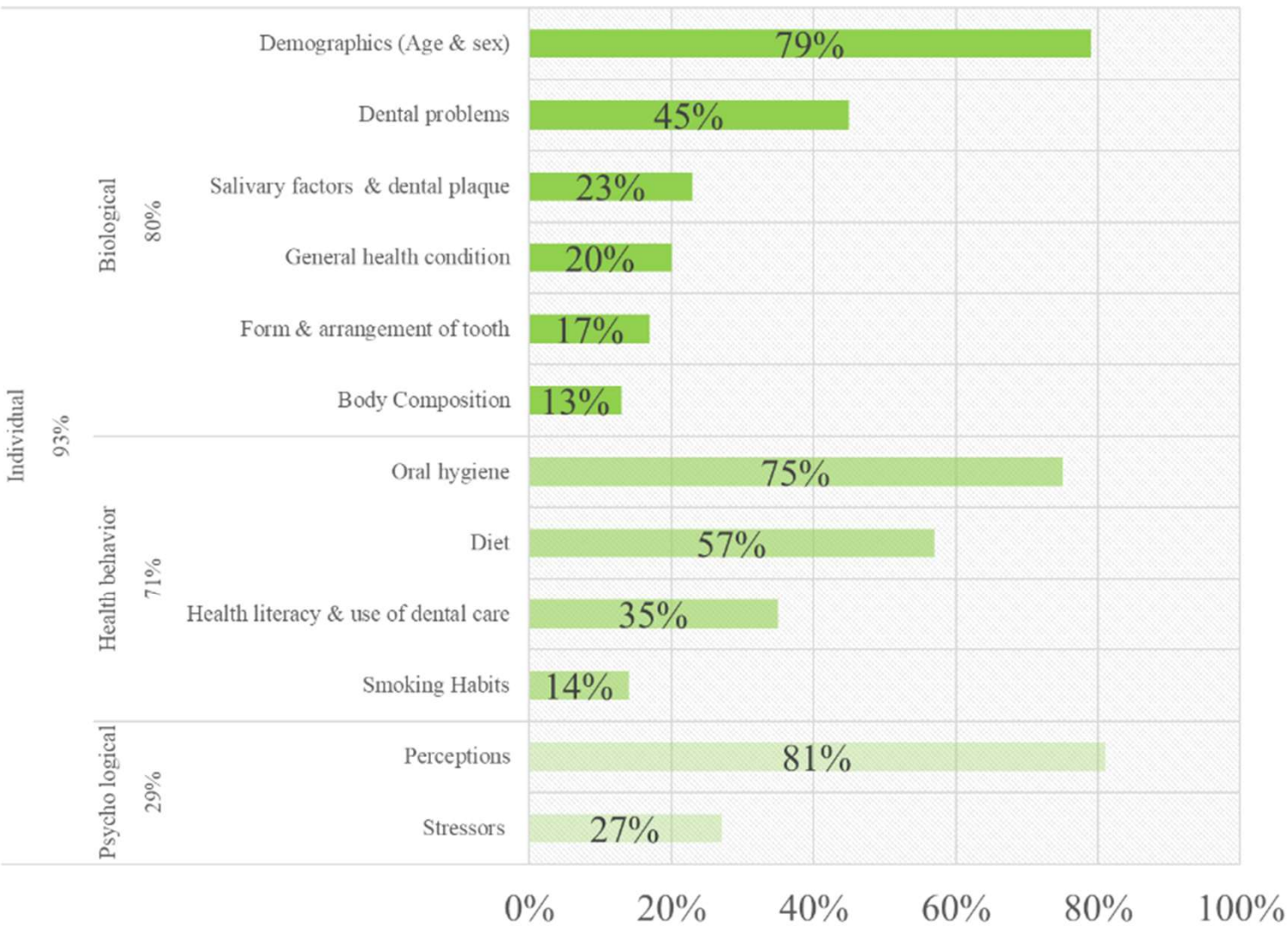
Individual Level Factors

Family Level Factors

Community Level Factors



## Individual Factors



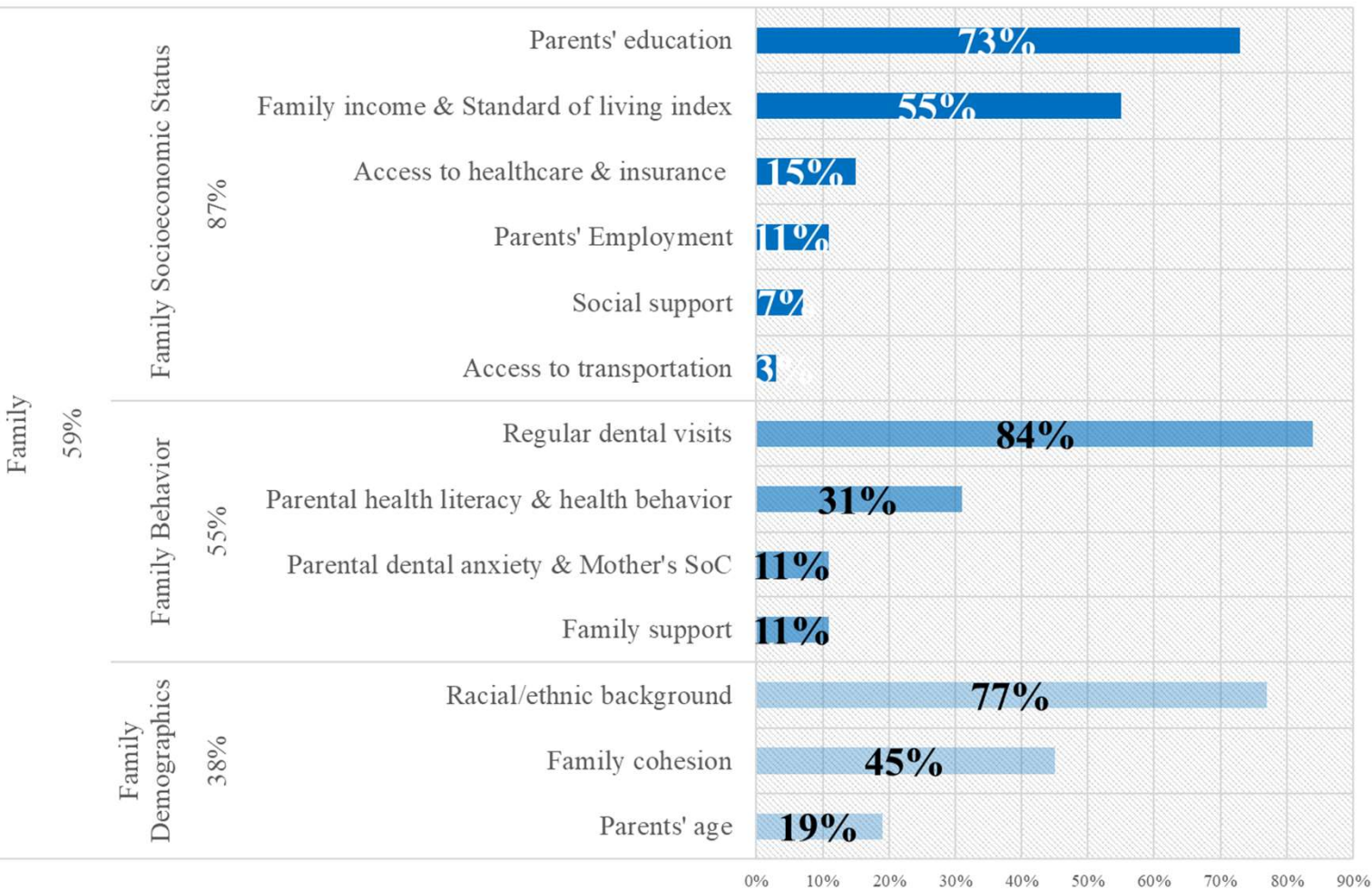
Multi Level  
Factors

Individual  
Level Factors

Family Level  
Factors

Community  
Level Factors

## Family Factors



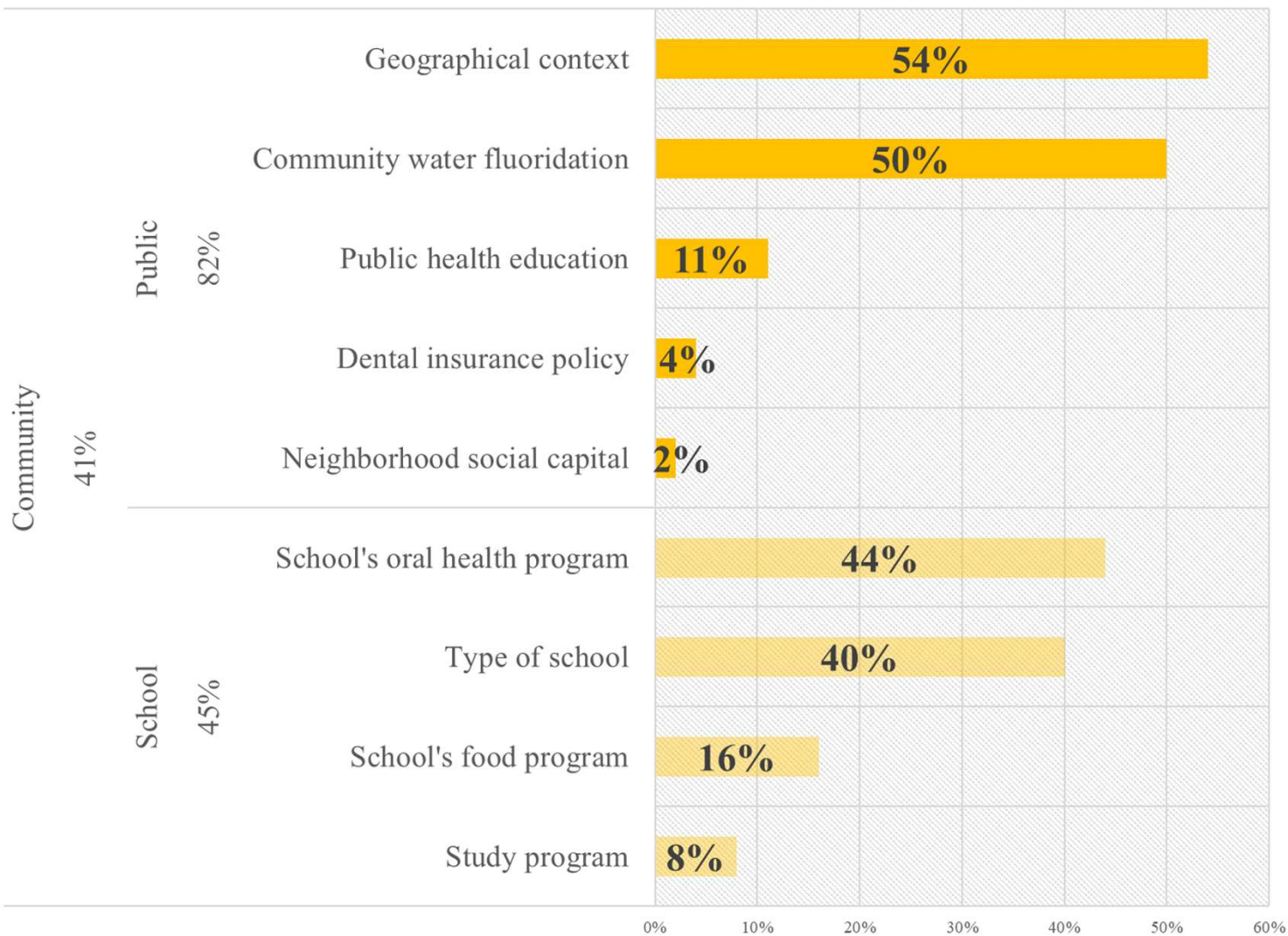
Multi Level  
Factors

Individual Level  
Factors

Family Level  
Factors

Community  
Level Factors

## Community Factors



Multi Level  
Factors

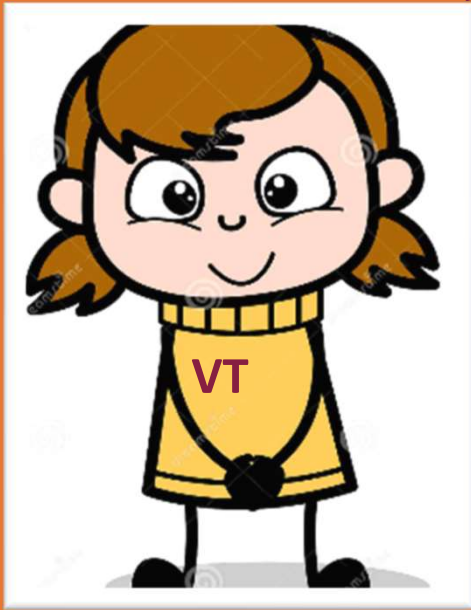
Individual Level  
Factors

Family Level  
Factors

Community  
Level Factors

# Causal Loop Diagram (CLD)

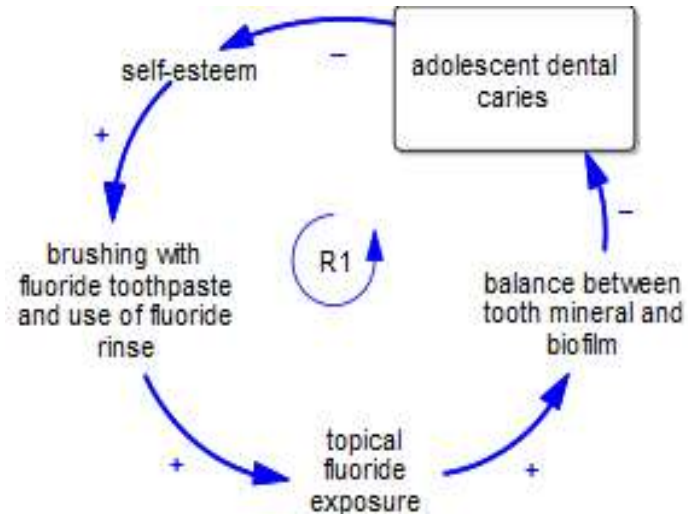




Hi!

# Meet Lia

# Dental caries & Deterioration in Self-esteem

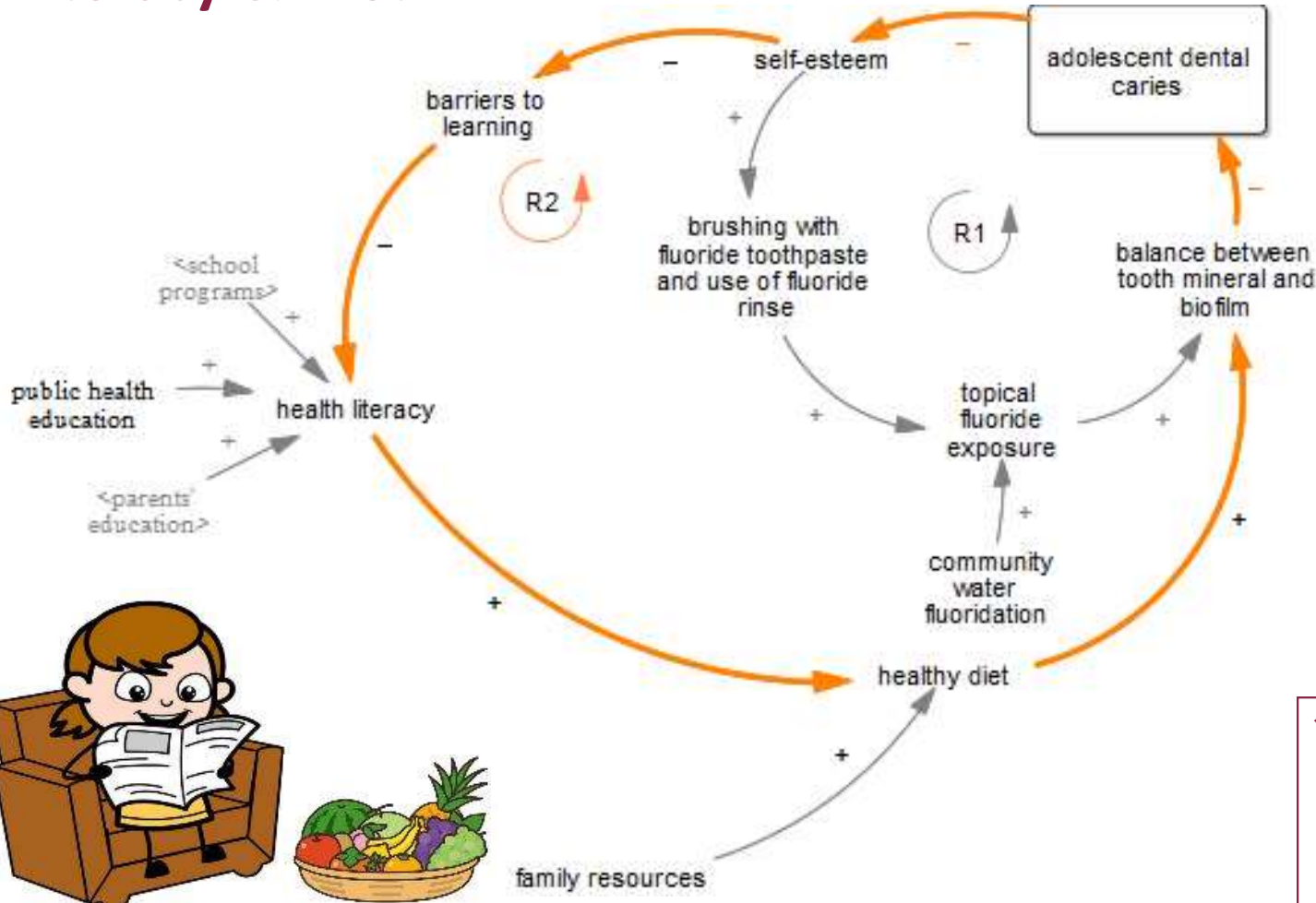


I have dental caries



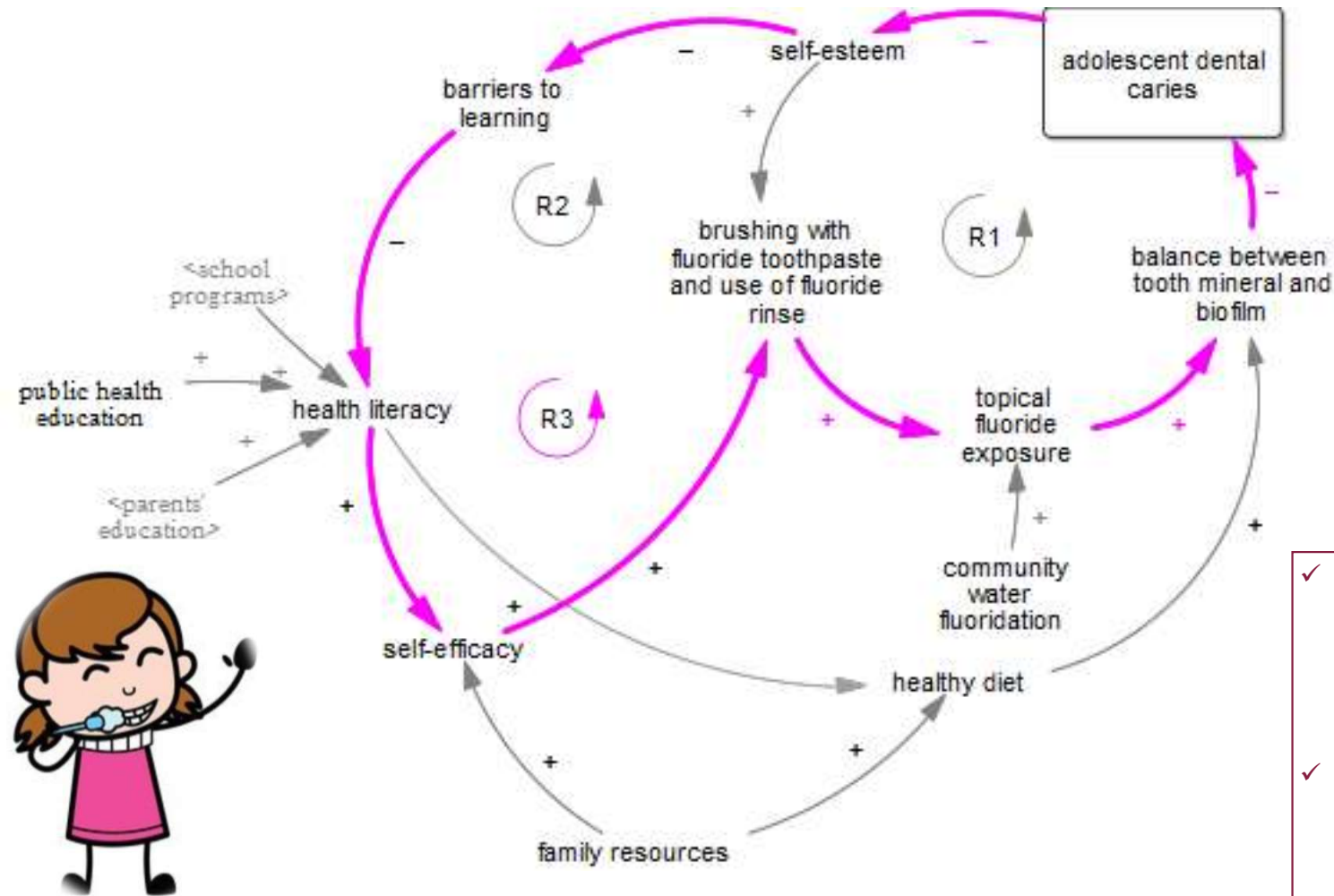
- ✓ Litt, M.D., S. Reisine, and N. Tinanoff, Multidimensional causal model of dental caries development in lowincome preschool children. *Public Health Rep*, 1995. 110(5): p. 607-17.
- ✓ McCaul, K.D., R.E. Glasgow, and C. Gustafson, Predicting levels of preventive dental behaviors. *J Am Dent Assoc*, 1985. 111(4): p. 601-5.

# Learning Barriers, Health Literacy & Diet



✓ Kristjánsson, A.L., I.D. Sigfúsdóttir, and J.P. Allegrante, Health behavior and academic achievement among adolescents: the relative contribution of dietary habits, physical activity, body mass index, and self-esteem. *Health Educ Behav*, 2010. 37(1): p. 51-64. 15

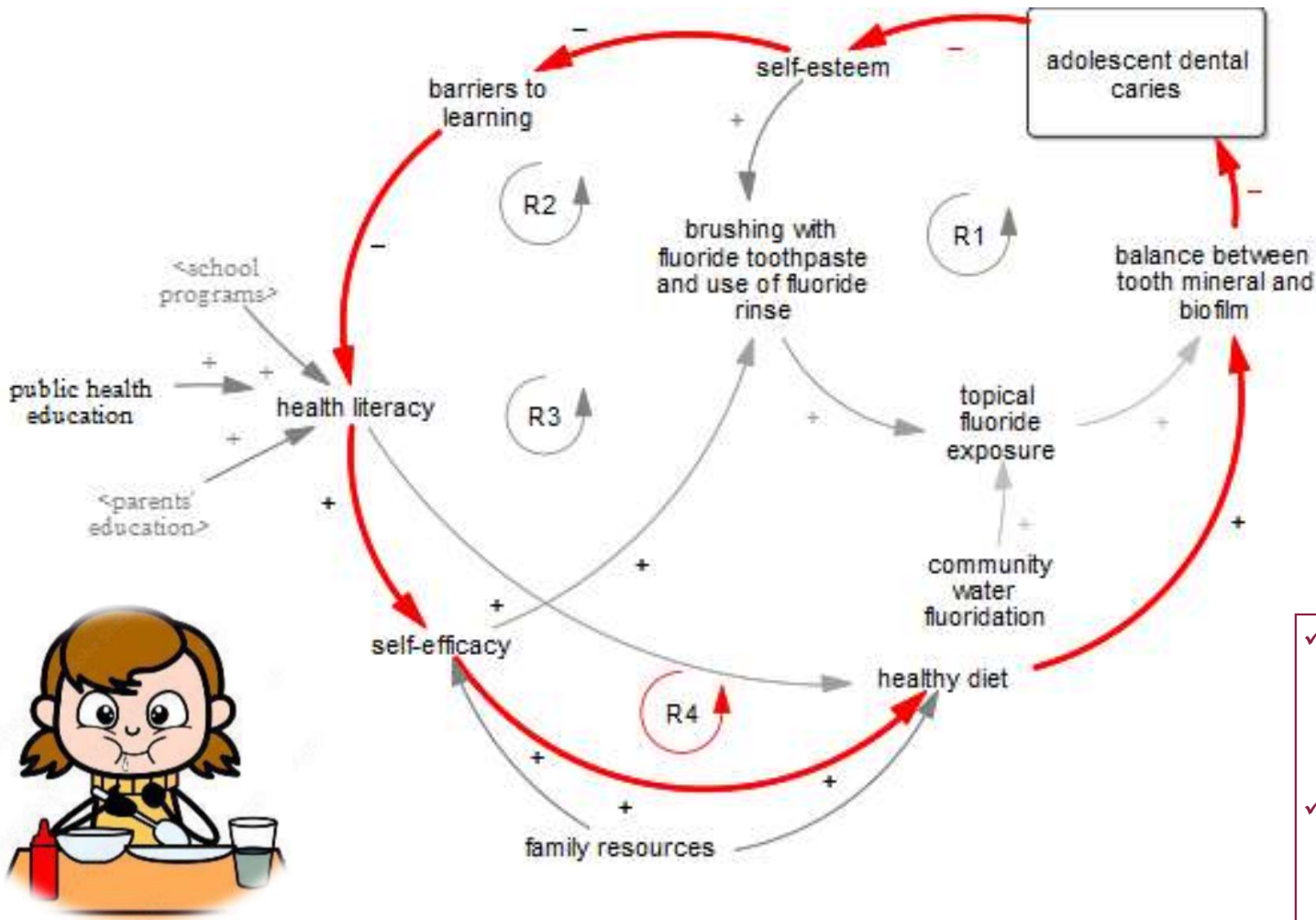
# Health Literacy & Self-efficacy



- ✓ Rachmawati, Y.L., D.A. Maharani, and T. Oho, Cross-cultural adaptation and psychometric properties of the Indonesia version of the self-efficacy oral health questionnaire for adolescents. *Int J Paediatr Dent*, 2019. 29(3): p. 345-351.
- ✓ Shirzaee, N., et al., Toothbrushing and related factors among high schoolstudents in the Southeast of Iran: A cross-sectional study. *Int J Dent Hyg*, 2021. 19(4): p. 360-365.

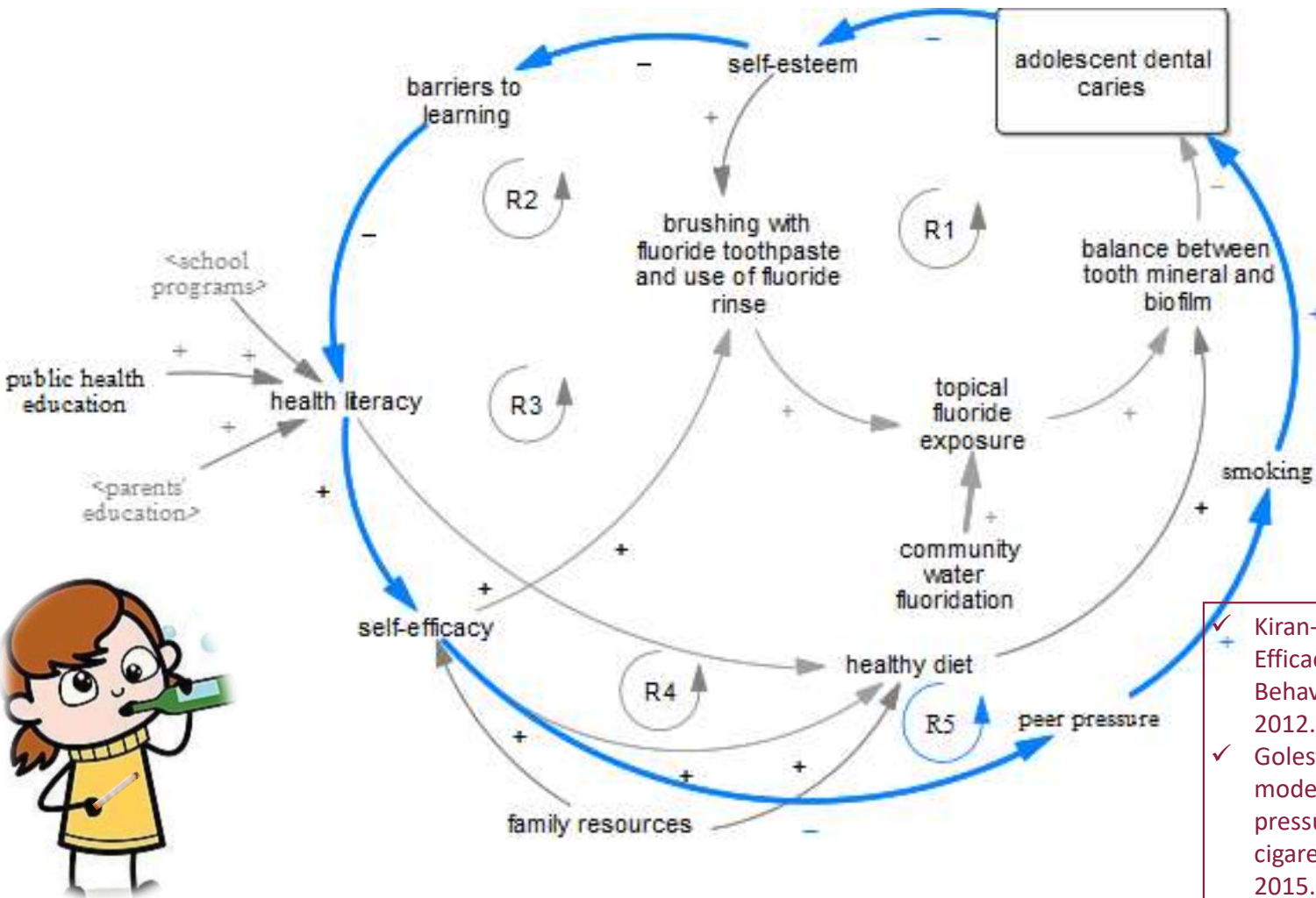


# Self-efficacy & Diet



- ✓ Xiang, B., et al., Modelling health belief predictors of oral health and dental anxiety among adolescents based on the Health Belief Model: a cross-sectional study. BMC Public Health, 2020. 20(1): p. 1755.
- ✓ Hall-Scullin, E., et al., A qualitative study of the views of adolescents on their caries risk and prevention behaviours. BMC Oral Health, 2015, 15: p. 141.

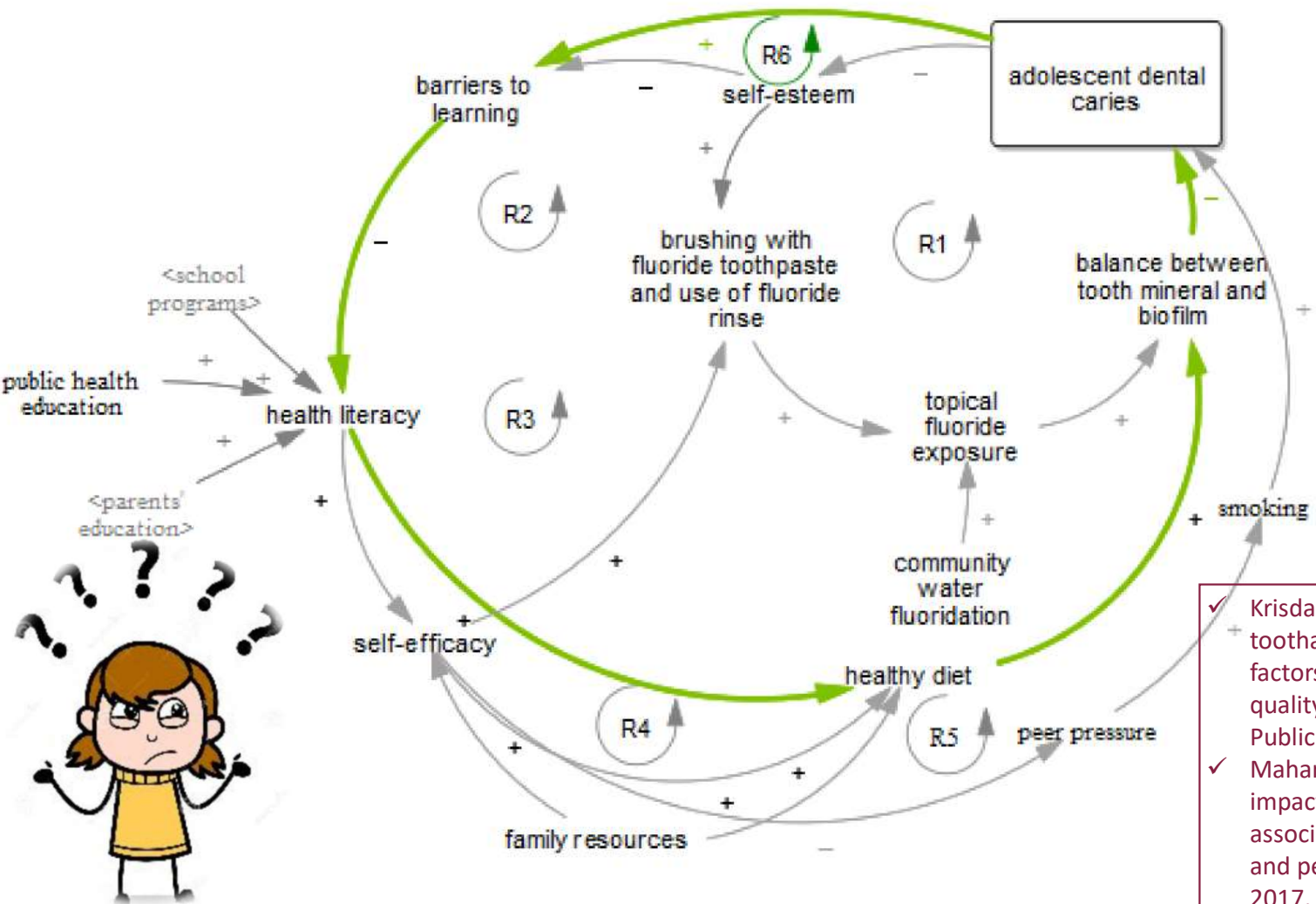
# Self-efficacy & Peer Pressure



- ✓ Kiran-Esen, B., Analyzing Peer Pressure and Self-Efficacy Expectations Among Adolescents. *Social Behavior and Personality: an international journal*, 2012. 40.
- ✓ Golestan, S. and H. Abdullah, Self-efficacy as a moderator in the relationship between peer pressure and family smoking, and adolescent cigarette smoking behavior. *Asian Social Science*, 2015. 11: p. 84.



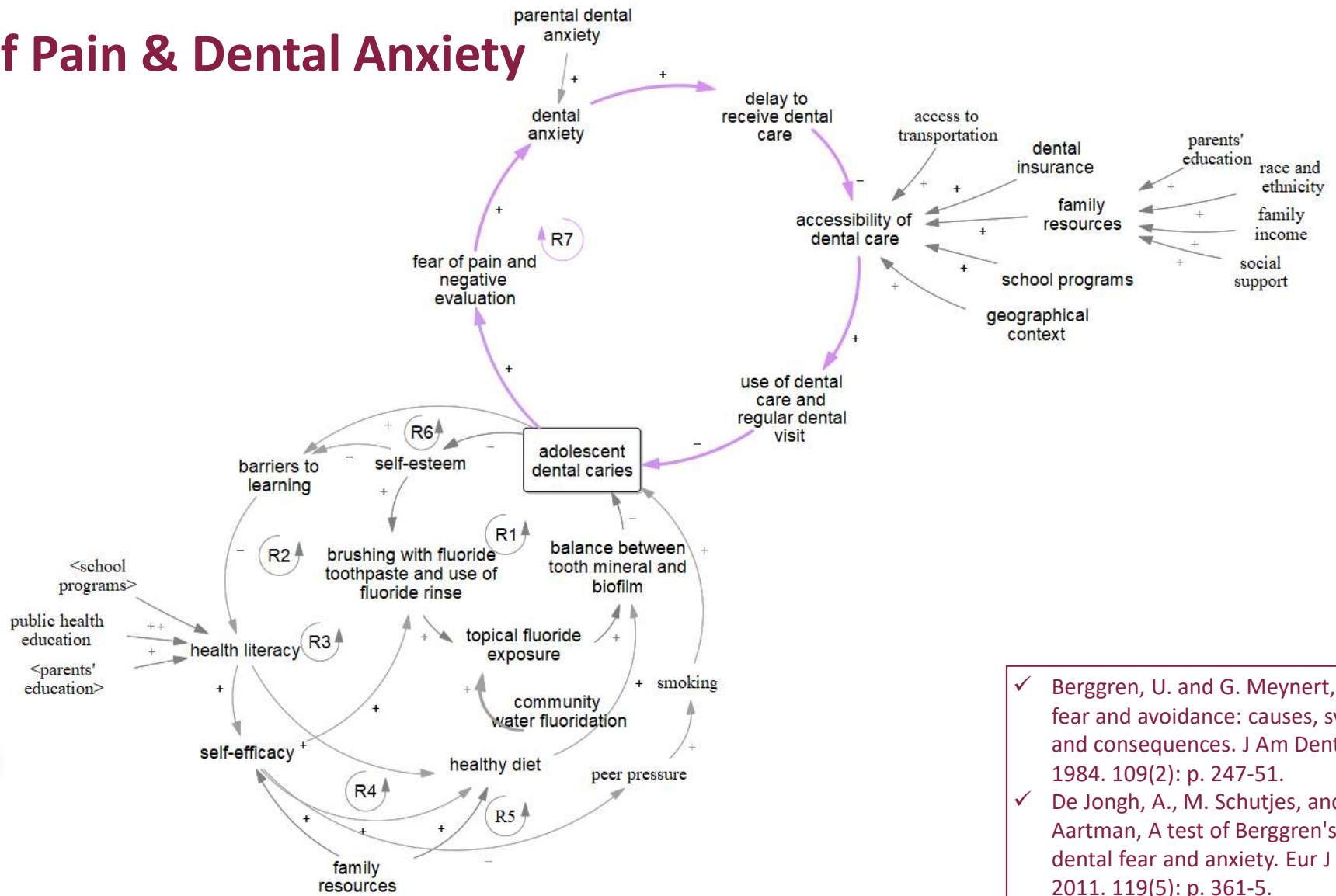
# Dental caries & Barriers (School Performance)



- ✓ Krisdapong, S., et al., School absence due to toothache associated with sociodemographic factors, dental caries status, and oral health-related quality of life in 12- and 15-year-old Thai children. *J Public Health Dent*, 2013. 73(4): p. 321-8.
- ✓ Maharani, D.A., et al., An assessment of the impacts of child oral health in Indonesia and associations with self-esteem, school performance and perceived employability. *BMC Oral Health*, 2017. 17(1): p. 65.



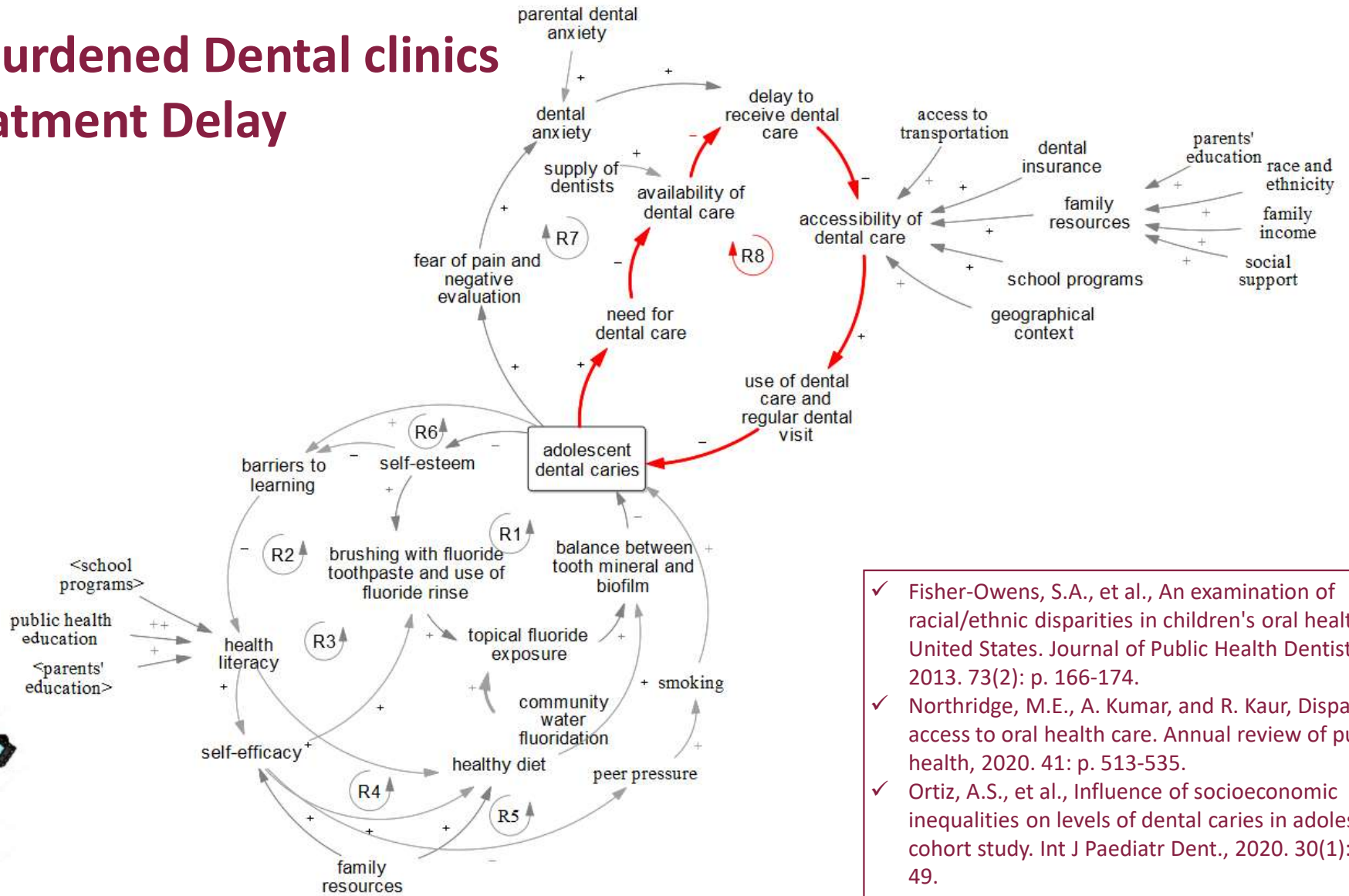
# Fear of Pain & Dental Anxiety



- ✓ Berggren, U. and G. Meynert, Dental fear and avoidance: causes, symptoms, and consequences. *J Am Dent Assoc*, 1984. 109(2): p. 247-51.
- ✓ De Jongh, A., M. Schutjes, and I.H. Aartman, A test of Berggren's model of dental fear and anxiety. *Eur J Oral Sci*, 2011. 119(5): p. 361-5.



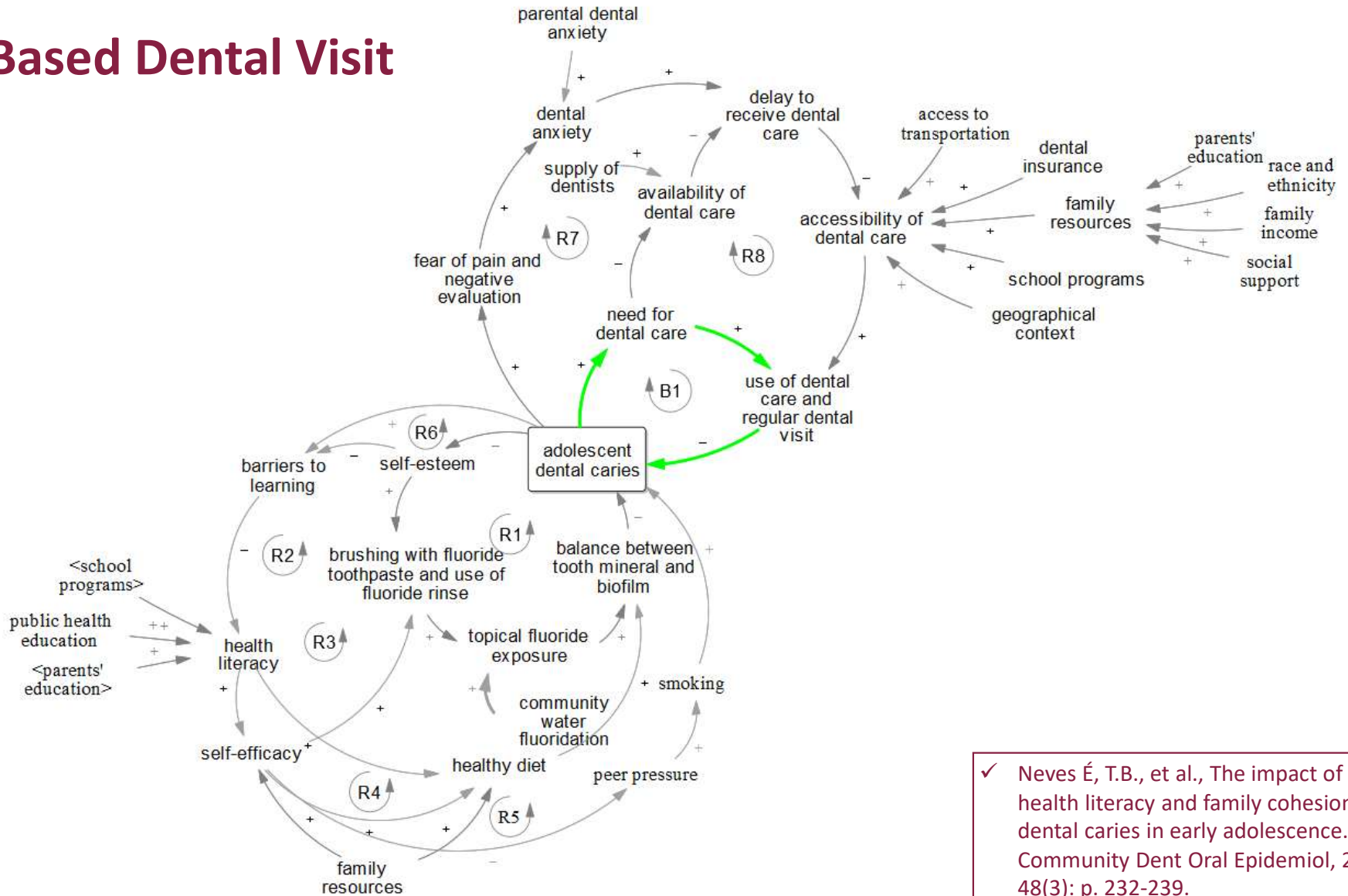
# Overburdened Dental clinics & Treatment Delay



- ✓ Fisher-Owens, S.A., et al., An examination of racial/ethnic disparities in children's oral health in the United States. *Journal of Public Health Dentistry*, 2013. 73(2): p. 166-174.
- ✓ Northridge, M.E., A. Kumar, and R. Kaur, Disparities in access to oral health care. *Annual review of public health*, 2020. 41: p. 513-535.
- ✓ Ortiz, A.S., et al., Influence of socioeconomic inequalities on levels of dental caries in adolescents: A cohort study. *Int J Paediatr Dent.*, 2020. 30(1): p. 42-49.



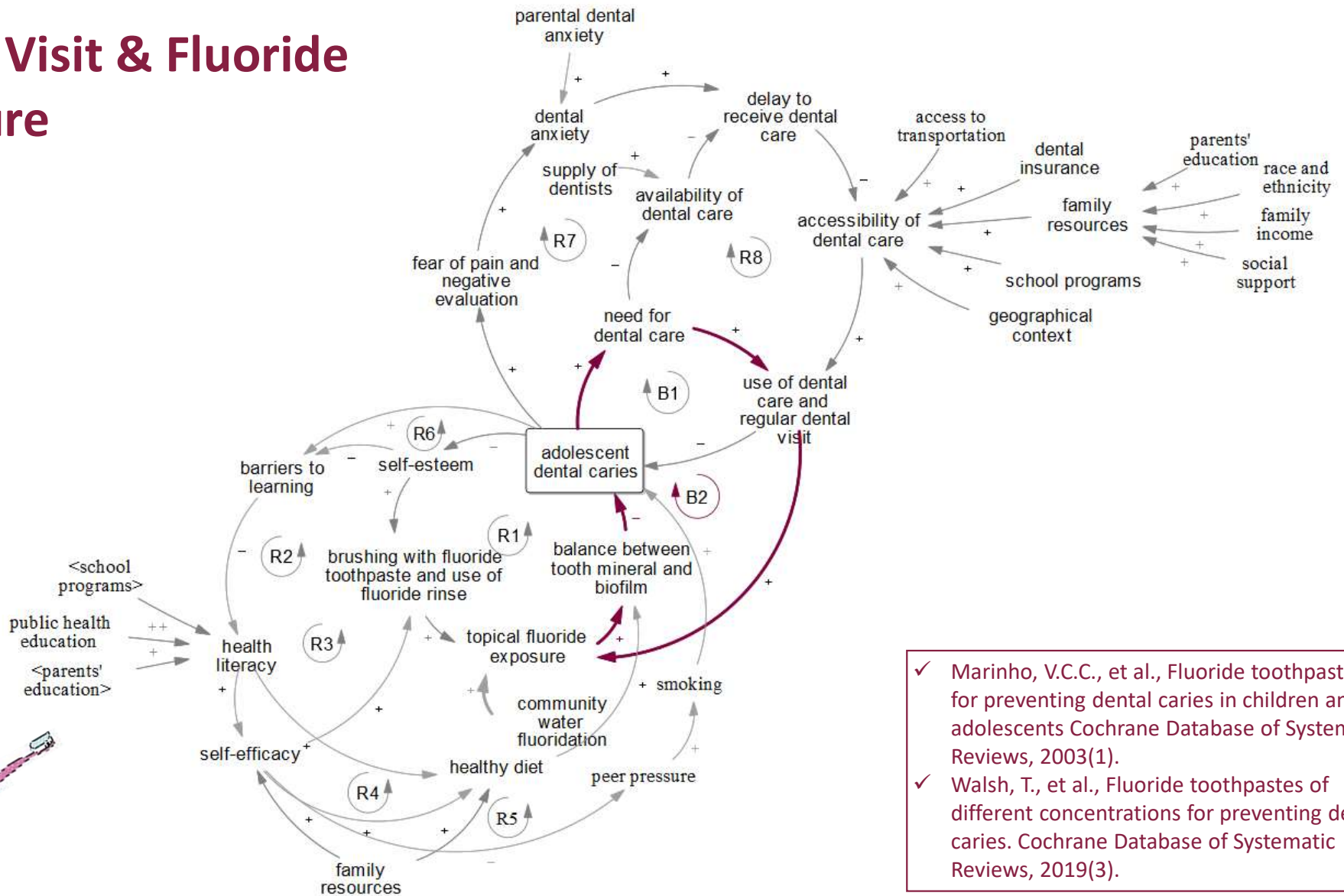
# Need-Based Dental Visit



✓ Neves É, T.B., et al., The impact of oral health literacy and family cohesion on dental caries in early adolescence. Community Dent Oral Epidemiol, 2020, 48(3): p. 232-239. 22



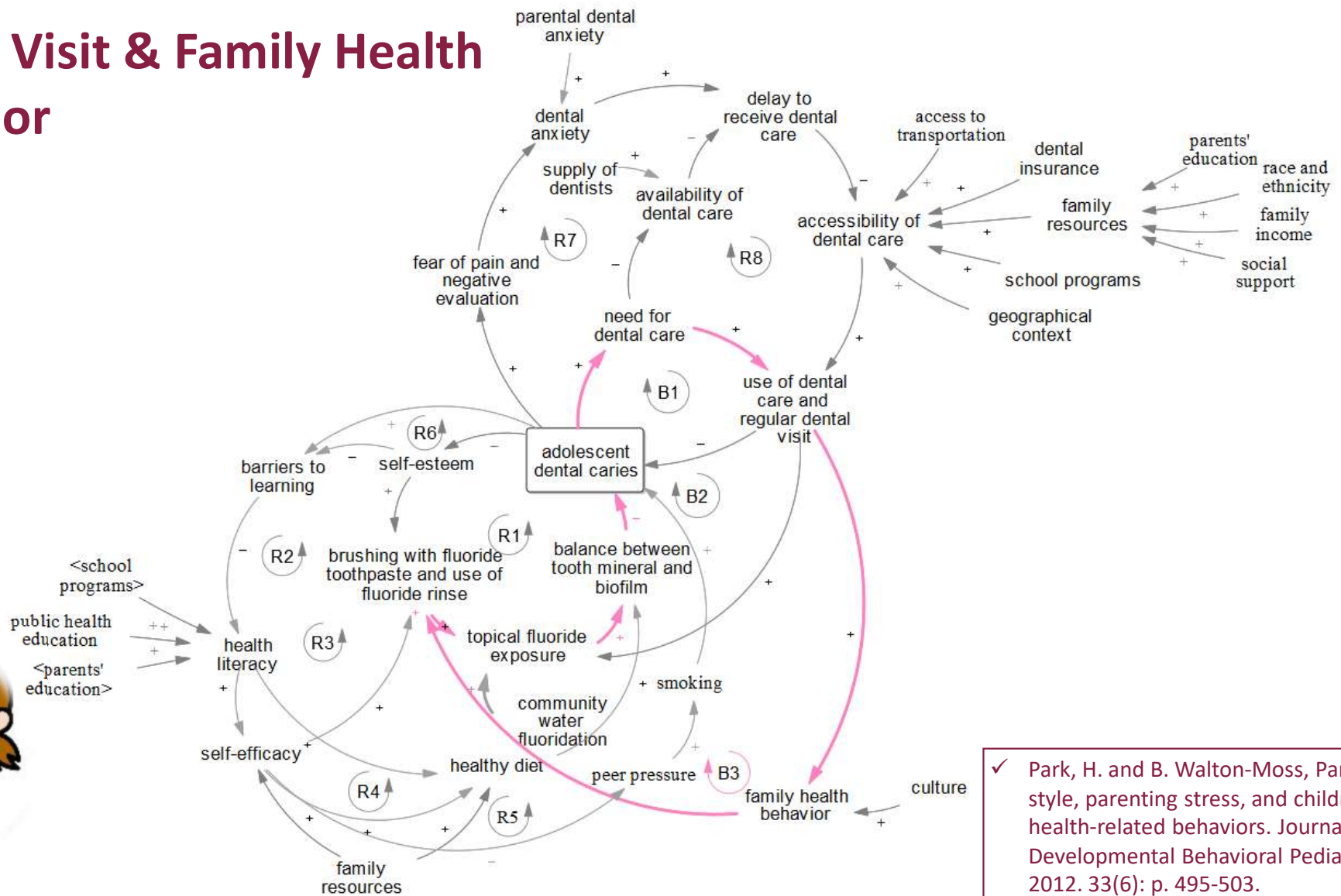
# Dental Visit & Fluoride Exposure



- ✓ Marinho, V.C.C., et al., Fluoride toothpastes for preventing dental caries in children and adolescents Cochrane Database of Systematic Reviews, 2003(1).
- ✓ Walsh, T., et al., Fluoride toothpastes of different concentrations for preventing dental caries. Cochrane Database of Systematic Reviews, 2019(3).



# Dental Visit & Family Health Behavior

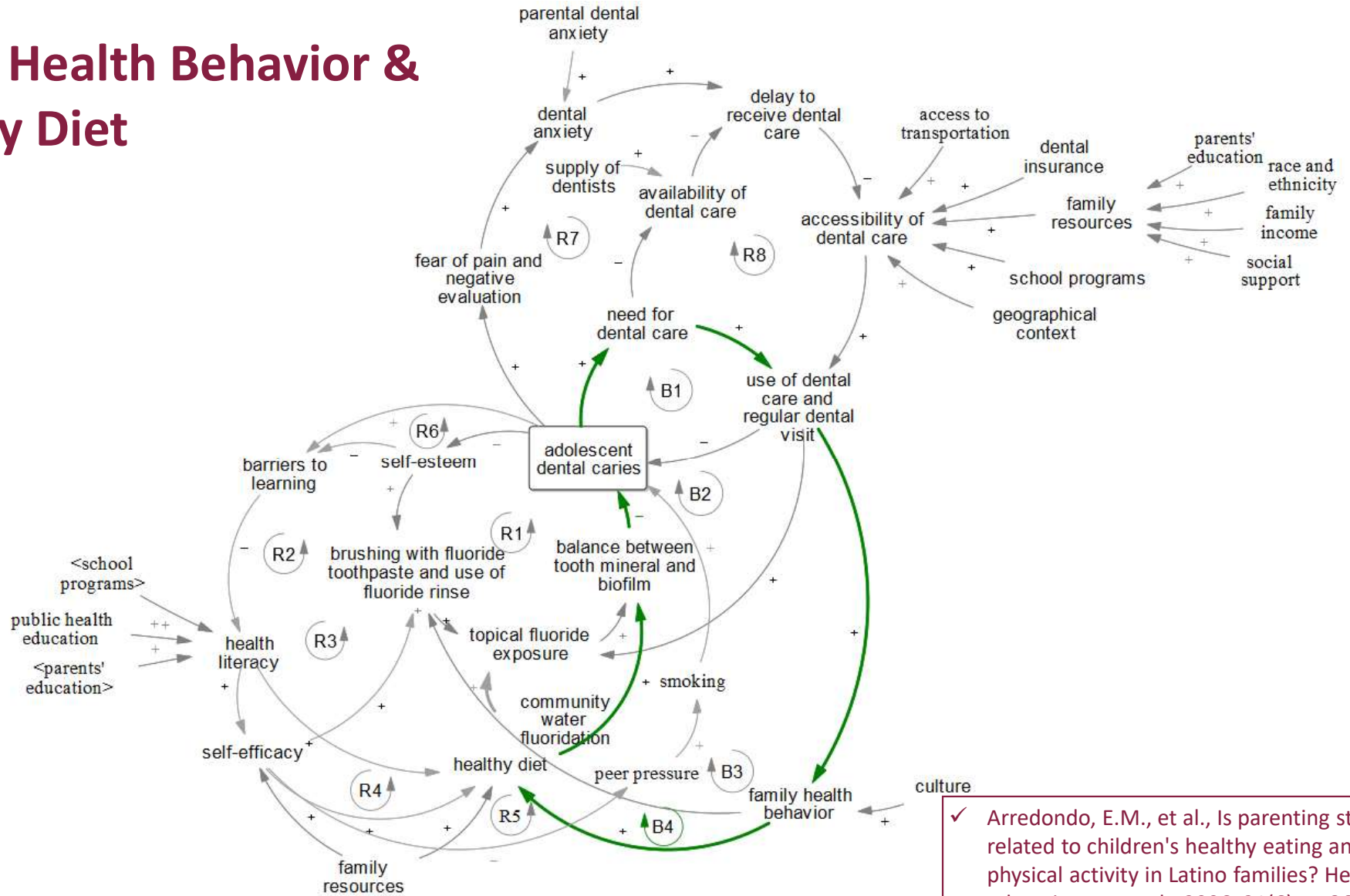


✓ Park, H. and B. Walton-Moss, Parenting style, parenting stress, and children's health-related behaviors. *Journal of Developmental Behavioral Pediatrics*, 2012. 33(6): p. 495-503. 24



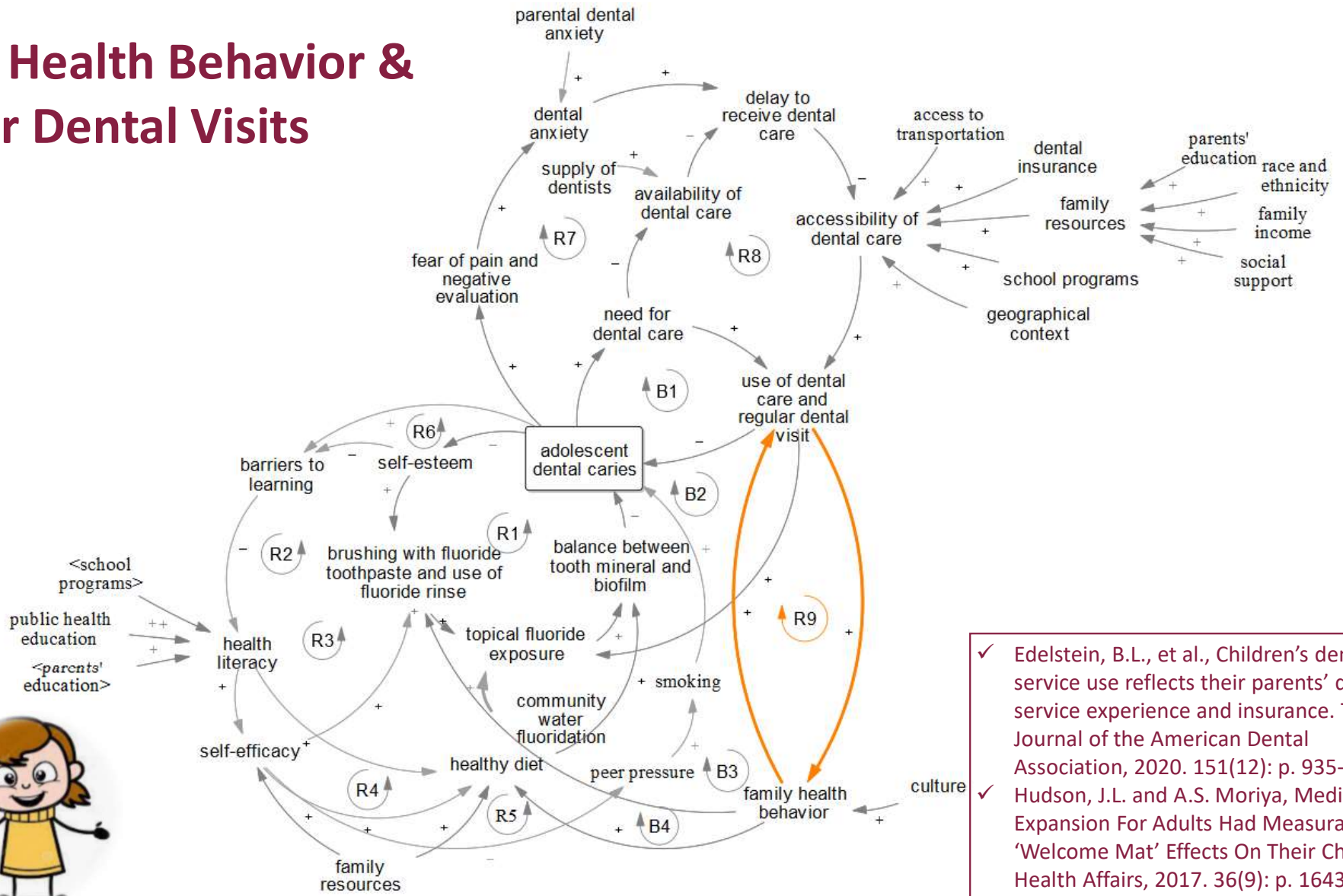


# Family Health Behavior & Healthy Diet



✓ Arredondo, E.M., et al., Is parenting style related to children's healthy eating and physical activity in Latino families? Health25 education research, 2006. 21(6): p. 862-871.

# Family Health Behavior & Regular Dental Visits



- ✓ Edelstein, B.L., et al., Children's dental service use reflects their parents' dental service experience and insurance. The Journal of the American Dental Association, 2020. 151(12): p. 935-943.
- ✓ Hudson, J.L. and A.S. Moriya, Medicaid Expansion For Adults Had Measurable 'Welcome Mat' Effects On Their Children. Health Affairs, 2017. 36(9): p. 1643-1651.

# Discussion



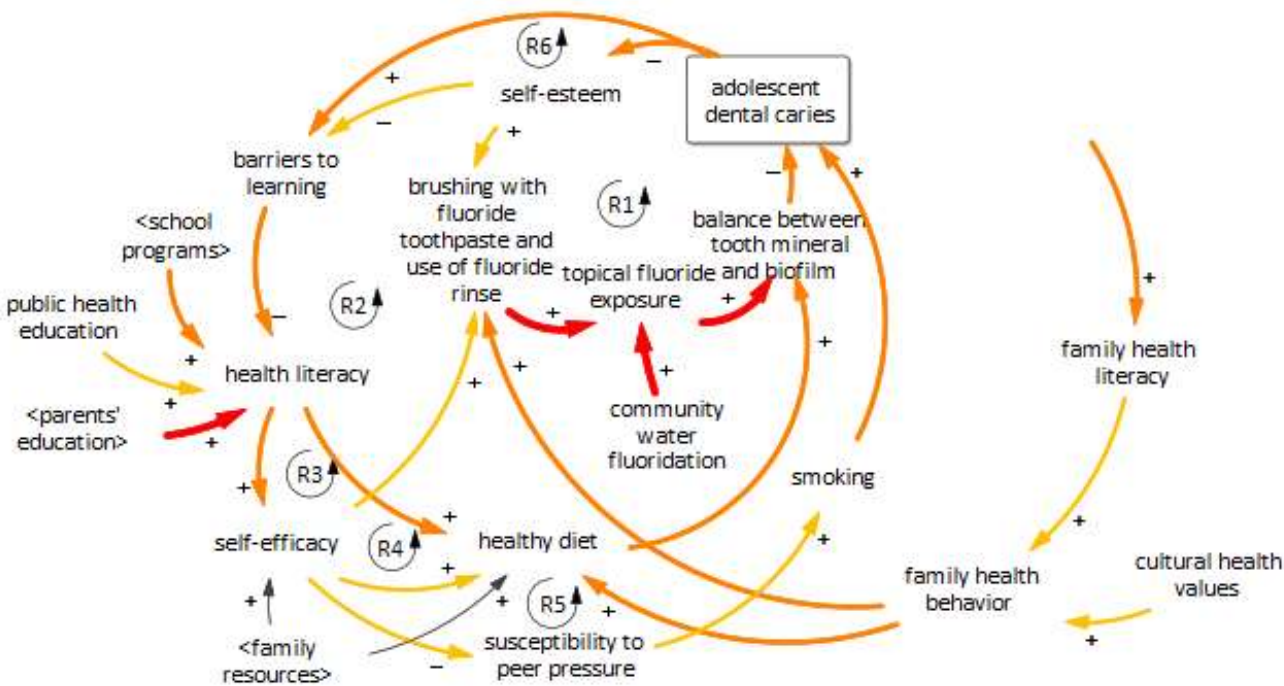


Figure 7: Causal loop diagram of feedback mechanisms affecting adolescents' dental caries

1 unit of thickness:	2 unit of thickness:	3 unit of thickness:	4 unit of thickness:
No reference	1-6 references	7-17 references	21-48 references

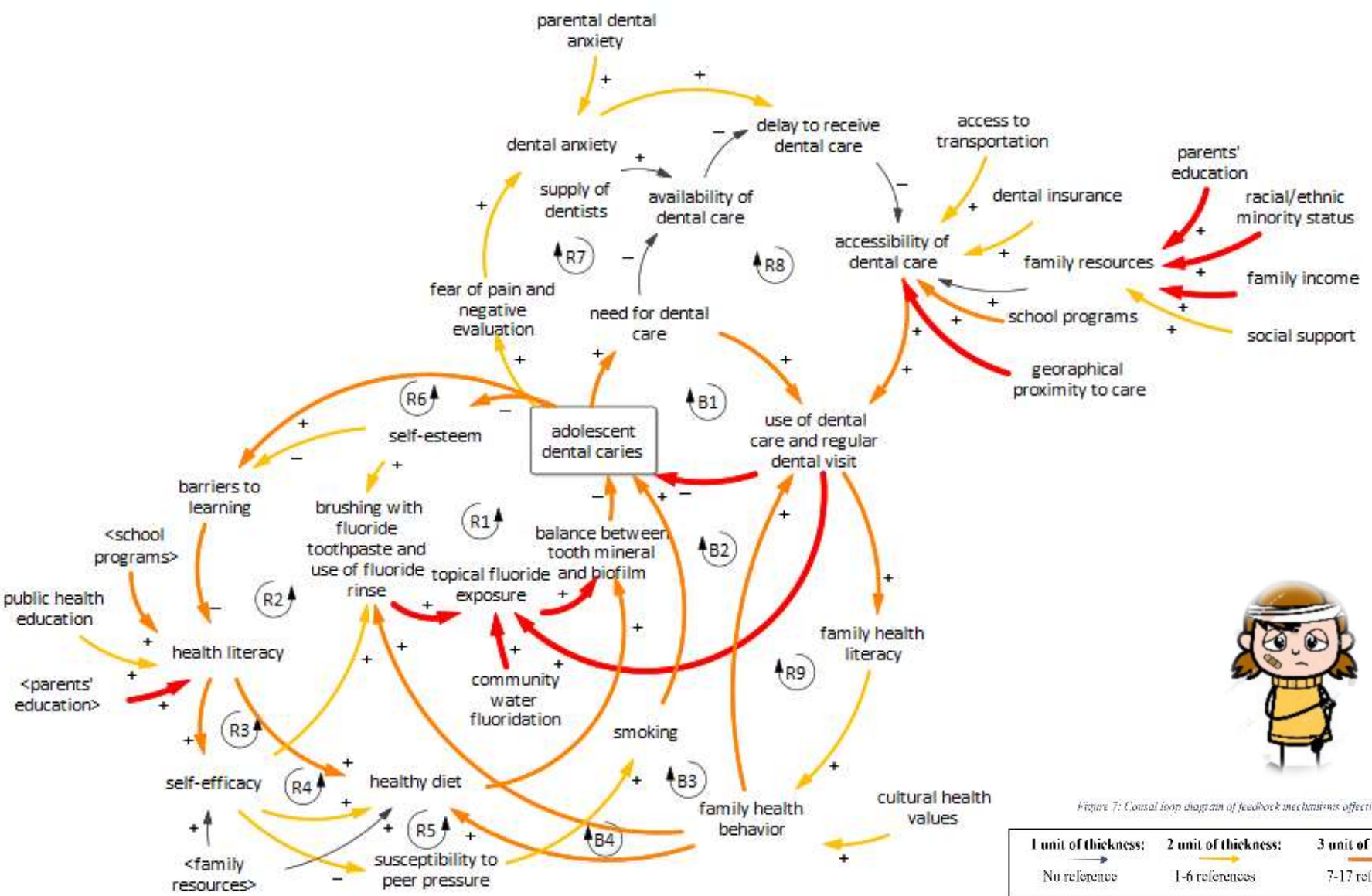


Figure 7: Causal loop diagram of feedback mechanisms affecting adolescents' dental caries

1 unit of thickness:	2 unit of thickness:	3 unit of thickness:	4 unit of thickness:
No reference	1-6 references	7-17 references	21-48 references

# Insights from Causal Loop Diagram:

- **Multiple trajectories** that keeps adolescents' dental caries persistent.
- **Deterioration in self esteem, self efficacy, and dental health.** (Reinforcing Loop R1 & R3 )
- **Exacerbation of dental caries for disadvantaged adolescents,** who receive care in overburdened dental clinics & delay treatment. (Reinforcing loop R8 )



# Insights from Causal Loop Diagram:

- **School programs** can work as a leverage by increasing health literacy.
- **Medicaid expansion** for adults has improvement effects on adolescents' enrollment. (Reinforcing loop R9)
- **Improving community characteristics & supply of dentists** for lower socioeconomic groups. (by state & federal government)



**Thank you!**  
**Any questions?!**

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