Research Article

Motivating the Patient: Constructing the Patient Motivation Framework from Vroom's Expectancy Theory

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Healthcare systems have expanded access through infrastructure, insurance, and workforce investment yet patient non-engagement persists even where structural barriers are absent. This paper argues that the residual explanatory variable is motivational, and that Victor Vroom's Expectancy Theory[1], with its multiplicative architecture, provides the most analytically tractable framework for modelling it. Transposing Vroom's three components Expectancy, Instrumentality, and Valence onto the care-seeking decision, this paper constructs the Patient Motivation Framework (PMF): a diagnostic tool that maps each component onto a distinct cognitive barrier systemic distrust, therapeutic scepticism, and optimistic bias and derives a targeted, evidence-based intervention for each. The PMF's defining contribution is its bottleneck logic: because motivation is a product of all three components, the lowest component functions as the binding constraint, and the intervention most worth making is the one that targets it. This diagnostic precision is less systematically available in additive or stage-based health behaviour models and has direct implications for reducing preventable non-engagement at scale. The PMF is theoretical and not yet prospectively validated; that limitation is acknowledged and constitutes the primary agenda for future empirical research.

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1. Introduction

The Patient Motivation Framework developed in this paper originated in observational fieldwork conducted in a community medicine setting in India (December 2025–January 2026). Over seven weeks, a consistent pattern emerged that structural access models could not explain: patients facing no

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meaningful financial or geographic barriers and in some cases already within the clinical encounter still did not engage. This observation motivates the framework developed in this paper.

The dominant logic in global health policy is structuralist: expand facilities, subsidise medicines, introduce insurance, deploy community health workers. Remove the structural obstacle, and patients will engage. For decades, this has been the central premise of supply-side health reform[2][3].

The evidence consistently complicates this premise. HIV treatment attrition in sub-Saharan Africa remained high despite substantial infrastructure investment and the introduction of free antiretroviral therapy; qualitative research from Tanzania identified stigma, social distrust, and perceived irrelevance not structural access as primary barriers[4]. The global mental health treatment gap stands at 76–85% in low- and middle-income countries[5][6] a figure that has proved substantially unresponsive to supply-side investment alone. Primary care utilisation among marginalised populations remains low even under universal coverage, with documented barriers clustering around anticipated poor treatment and low perceived need[7][8].

These are not failures of access. They are failures of motivation and they are preventable. This paper proposes that Victor Vroom's[1] Expectancy Theory provides a theoretically rigorous, clinically actionable account of how motivational non-engagement operates. The Patient Motivation Framework (PMF) constructed here maps Vroom's three components onto the care-seeking decision, identifies three distinct preventable cognitive barriers, and derives a targeted, evidence-based intervention for each. Prevention is the organising logic throughout: the PMF is built not to explain non-engagement after it has occurred, but to prevent the conditions that produce it.

2. Why Vroom? The Analytical Case and Its Limits

The health behaviour literature is well-populated. The Health Belief Model[9] identifies perceived susceptibility, severity, benefits, and barriers. The Theory of Planned Behaviour[10] decomposes intention into attitude, subjective norm, and perceived control. The Transtheoretical Model[11] stages readiness for change. Protection Motivation Theory[12] separates threat appraisal from coping appraisal. Each framework identifies constructs that matter. None provides a direct mechanism for identifying which construct is the operationally binding constraint in a specific case.

Vroom's multiplicative structure addresses this. Motivational Force = Expectancy × Instrumentality × Valence. Because motivation is a product rather than a sum, these are not independent additive contributions: when any component approaches its lower bound, overall motivational output collapses regardless of the strength of the others. In clinical terms, the components function as a bottleneck system. The intervention most worth making is the one targeting the component that is most suppressed, because strengthening others produces diminishing returns while the primary bottleneck remains. This is importantly different from additive models, in which effort directed at any construct yields proportional gain. To be precise: the claim is not that components literally reach zero in practice they are continuous variables but that a single severely suppressed component dominates the motivational outcome. That is the diagnostic logic the PMF operationalises. It does not tell a clinician that motivation is generally low; it identifies which component has failed, and therefore which intervention is required.

The closest competitor is Protection Motivation Theory. PMT is a serious framework its separation of threat appraisal from coping appraisal captures real cognitive architecture. Its critical limitation is that it does not disaggregate Expectancy from Instrumentality, and therefore cannot distinguish between a patient who believes care is inaccessible (Expectancy failure) and one who believes care is accessible but ineffective for them personally (Instrumentality failure). These are fundamentally different diagnoses requiring fundamentally different interventions. Vroom's three-component structure captures this distinction; PMT does not.

The transposition from workplace to patient context rests on structural homology, not metaphor. Vroom models effort decisions under uncertainty by goal-directed agents. The employee's question if I try, will I succeed; if I succeed, will I be rewarded; is the reward worth it? maps directly onto the patient's: if I engage, will the system respond; if it responds, will treatment help me; is my health worth the cost and exposure? Both decisions share the same cognitive architecture: a costly action, an uncertain causal chain, and a subjective valuation of the outcome. Vroom's framework has been applied in educational psychology[13] and healthcare workforce motivation[14][15]. The patient as motivated decision-maker is the logical next step. A meta-analysis by Van Eerde and Thierry[16] confirmed that expectancy components are empirically separable and reliably predictive across decision contexts which supports their analytical independence in the PMF.

One structural difference between workplace and patient contexts deserves explicit treatment. Workplace motivation operates across repeated decisions with frequent feedback, which allows Expectancy the

belief that effort will yield a response to be recalibrated continuously through experience. Healthcare-seeking decisions are typically episodic and infrequent. This is not a weakness of the transposition; it is a clarification that strengthens it. Because patients have far fewer opportunities to update a suppressed Expectancy through positive counter-experience, a single negative clinical encounter can entrench an Expectancy failure with a persistence that would be unusual in a daily-feedback employment context. The episodic structure of healthcare decisions is precisely why relational repair is so much harder than relational prevention and why the PMF's prevention orientation is not merely a normative preference but a consequence of how Expectancy is formed and sustained in this domain.

One honest limitation must be stated here. Vroom's original framework assumes an individualistic cognitive architecture. In collectivist settings, health-seeking decisions are often distributed across family and community networks, meaning Expectancy, Instrumentality, and Valence may be held by different agents rather than by the patient alone. The PMF's individual-level framing is adequate for the contexts in which it is initially developed, and is a known boundary condition addressed explicitly in Section 5.

3. The Patient Motivation Framework

The PMF reconceptualises the patient not as a passive recipient of healthcare access but as a motivated agent making a structured decision under uncertainty. Each Vroom component corresponds to a distinct preventable cognitive barrier and a targeted class of intervention.

Vroom Component	Patient Question	Primary Barrier	PMF Intervention Class
Expectancy	Will the system actually help me if I engage?	Systemic distrust; low self-efficacy; prior negative experience	Relational trust-building; named provider continuity; CHW accompaniment
Instrumentality	If I go, will treatment actually work for someone like me?	Stigma; therapeutic scepticism; internalised marginalisation	Peer testimony; contact-based stigma reduction; outcome-focused counselling
Valence	Do I feel personally at risk enough to act now?	Optimistic bias; low perceived personal susceptibility	Personalised risk communication; family history elicitation; natural frequency framing

Table 1. The Patient Motivation Framework: Vroom's components transposed onto patient-level cognitive barriers.

3.1. Expectancy: Systemic Distrust as the Preventable Feasibility Barrier

Expectancy is the patient's belief that engaging with the healthcare system will produce a genuine response. Structural reform raises Expectancy by reducing cost and distance but only partially, and only along one dimension. The most consequential Expectancy failures are relational.

Prior negative encounters dismissive consultations, unexplained delays, perceived differential treatment generate a generalised inference: the system does not respond reliably to people like me. Once formed, this belief persists independently of subsequent structural improvement[7]. Thornicroft et al.[17], in a 27-country study, found that anticipated discrimination predicted non-engagement with mental health services independently of experienced discrimination a textbook Expectancy failure. Bandura's[18] self-efficacy construct reinforces this: patients with low confidence in navigating clinical encounters face a motivational barrier functionally indistinguishable from a severely suppressed Expectancy. Historically marginalised populations show systematically lower healthcare self-efficacy, which operates as a durable and preventable Expectancy suppressor[8][19].

The prevention implication is direct: Expectancy failure is built through the accumulation of negative system experiences. Preventing those experiences through workforce cultural competency training, proactive feedback mechanisms, and patient advocacy structures is more efficient and more ethical than attempting relational repair after trust has already collapsed.

3.2. Instrumentality: Stigma and Therapeutic Scepticism as the Preventable Efficacy Barrier

Instrumentality is the patient's belief that engagement, if achieved, will produce genuine improvement in their specific situation. The structural availability of treatment is motivationally irrelevant if the patient does not believe treatment will work for someone like them.

Corrigan, Druss, and Perlick[20] distinguish two operationally distinct stigma forms: personal stigma (internalised shame) and perceived stigma (anticipated social judgment upon help-seeking). Both generate the same Instrumentality-level inference that treatment reinforces marginalisation rather than resolves it. The WHO[5] identifies stigma as the single most significant predictor of mental health treatment non-initiation across low- and middle-income settings, with comparable evidence in high-income contexts[21]. Therapeutic scepticism operates through a different channel community counter-narratives and historical institutional mistrust but produces structurally similar outcomes. Kalichman et al.[22] demonstrated that treatment beliefs among HIV-positive individuals significantly predicted health engagement: those holding sceptical beliefs about antiretroviral efficacy showed systematically altered health behaviours, confirming that Instrumentality the conviction that treatment will actually help functions as a distinct motivational variable independent of structural access to care.

Levesque, Harris, and Russell's[23] access framework identifies acceptability the cultural and personal congruence of care as a systematically underweighted dimension of access. Within the PMF, acceptability is precisely the condition necessary for Instrumentality to be preserved. Systems that fail to deliver culturally acceptable care are not passively missing an opportunity; they are actively manufacturing Instrumentality failure in the populations they serve.

3.3. Valence: Optimistic Bias as the Preventable Relevance Barrier

Valence is the patient's subjective valuation of the health outcome at stake specifically, whether the threat registers as sufficiently real and personal to motivate action. A patient may acknowledge that a condition is serious, that treatment works, and that services are available, and still not act, because the threat does

not feel like theirs. This is Valence failure, driven by optimistic bias: the cross-culturally documented tendency to believe that negative events are less likely to happen to oneself than to comparable others[24].

Kahneman and Tversky's[25] Prospect Theory provides the complementary mechanism: individuals respond to losses most strongly when those losses are perceived as proximate and vivid. Population-level risk statistics address the statistical individual; they do not generate phenomenological urgency for the specific self. Slovic[26] demonstrated that subjective risk perception is critically shaped by vividness, personal familiarity, and dread features absent from aggregate broadcast communication. This is why public health campaigns can raise population awareness while leaving individual Valence unchanged.

The prevention implication is structural: communications designed to reduce Valence failure must be built for personalisation, not broadcast. This is a systems design requirement, not merely a clinical communication technique.

3.4. A Worked Diagnostic Example

A 47-year-old woman attends a community health outreach session with a resting blood pressure of 148/91 mmHg and a family history of hypertension. She has not seen a physician in three years. The community health worker explains her cardiac risk. She nods and does not attend the follow-up appointment.

A generic response adds more statistics. The PMF diagnostic asks three targeted questions first. Starting with Valence: she explains that her father's problems started in his late 50s, that she feels well, and that it will probably not happen for a while. This is Valence failure. The intervention is not more data it is personalised risk communication: "Your blood pressure is at the level your father's was when he first received this warning. His cardiac event was at 52. That is five years from now." Vividness, personal reference, proximate timeline: these are the Valence intervention levers.

If Valence were intact, the diagnostic would proceed to Instrumentality. If she expresses concern but says prior clinic visits left her with generic advice she did not understand, that is Instrumentality failure with secondary Expectancy implications: she believes engagement is feasible but doubts it will help her specifically. The intervention shifts to relational: a warm handoff to a named provider, CHW accompaniment, peer testimony. The diagnostic precision of the PMF lies in this specificity. Two patients with identical blood pressure readings and identical structural access can have entirely different motivational bottlenecks one Valence, one Instrumentality requiring entirely different, entirely preventable interventions.

4. Prevention-Oriented Recommendations

4.1. Preventing Expectancy Failure: Relational System Design

Because Expectancy failure is a belief about system responsiveness, interventions must be relational rather than informational. Information-based demand-side communication assumes patients lack knowledge; Expectancy failure assumes they lack trust. These are not the same problem, and treating them as such is a category error that health systems routinely make.

Continuity of care assigning patients to consistent, named providers directly reinforces the belief that engagement will yield a predictable, responsive experience. Cross-national evidence associates continuity with improved engagement and higher follow-up rates[27][28]. Community health worker accompaniment to first appointments provides a trusted social intermediary who bridges the patient's world and the formal system[29]. The CHW's function here is motivational, not logistical. Critically, workforce training in non-discriminatory and culturally competent communication should be treated as a primary prevention measure it prevents Expectancy failure from being generated in the first place, rather than attempting repair after trust has already collapsed.

4.2. Preventing Instrumentality Failure: Narrative and Contact-Based Approaches

Because Instrumentality failure is a belief about personal treatment efficacy, the interventions it requires are narrative and contact-based rather than statistical. Aggregate evidence of treatment effectiveness does not reach Instrumentality failure it addresses a population; the patient's scepticism operates at the level of identity. The question is not whether treatment works; it is whether it works for someone in their specific social position.

Corrigan et al.[20] demonstrated that contact-based stigma reduction structured interaction with peers who have successfully engaged with health services for a stigmatised condition produces significantly larger and more durable reductions in non-initiation than educational campaigns. The mechanism is narrative: the recovered peer constitutes a credible, socially proximate proof of concept. Evidence extends across mental health, HIV adherence[4], and chronic disease self-management[30]. The prevention logic is that communities with strong positive treatment narratives in circulation will generate lower baseline rates of Instrumentality failure over time making peer ambassador programmes a population-level prevention investment, not just a clinical tool.

4.3. Preventing Valence Failure: Personalised Risk Communication at Scale

Because Valence failure is a deficit of perceived personal relevance, interventions must personalise rather than broadcast. Clinical encounters should routinely include family history elicitation as a Valence-building tool: it converts statistical risk into personal narrative grounded in the patient's relational experience. Risk communication in natural frequency formats for example, pictographs showing that 4 out of 10 individuals with this specific measured risk profile will experience the outcome within five years produces greater perceived susceptibility than percentage-based equivalents[26][31].

The Prospect Theory principle is straightforward: a proximate, vivid, personally relevant potential loss generates motivational force that a statistically larger but phenomenologically remote one does not. Public health communication systems must therefore be architecturally redesigned for personalisation rather than mass broadcast a structural shift with significant health systems design implications, and the only communication approach that reliably addresses Valence failure at scale.

5. Limitations and Directions for Future Research

The PMF is a theoretical construction derived from conceptual transposition and supported by convergent cross-national evidence. Its validity rests on the coherence of the transposition and the strength of the component literatures. Both are substantial. What is absent is prospective empirical validation studies directly testing whether PMF-targeted interventions produce superior engagement outcomes relative to standard care. This is not a minor gap; it is the central limitation. A theoretically elegant framework that has not been tested against patient populations remains provisional, and practitioners should treat it as such.

Vroom's original model assumes individualistic cognitive architecture. In collectivist settings where health-seeking decisions are characterised by distributed family and community agency, Expectancy, Instrumentality, and Valence may be held by different agents rather than by the patient alone[32][33]. The PMF's individual-level framing is adequate for initial development, but future versions must extend the unit of analysis to the household or community network. The three components should also be treated empirically as potentially compounding rather than independent: severe Instrumentality failure through stigma can generate secondary Expectancy failure through progressive system estrangement, as the worked example in Section 3.4 illustrates.

The primary agenda for future research is threefold: first, development of a PMF-based assessment instrument operationalising each component as a measurable construct in patient populations; second, prospective trials examining whether component-specific interventions outperform generic health promotion for patients with identified motivational bottleneck profiles; and third, integration of social network effects, given that Expectancy, Instrumentality, and Valence are substantially shaped by the health behaviours and experiences of individuals in the patient's immediate network[34][35].

6. Conclusion

Healthcare systems have been extraordinarily effective at solving the access problem. They have been much less effective at solving what comes after access the moment when a patient, facing no structural barrier, still does not engage. That moment has no home in the structuralist paradigm. It has a precise home in the PMF.

The Patient Motivation Framework identifies three distinct, preventable cognitive bottlenecks: Expectancy failure rooted in systemic distrust and low self-efficacy; Instrumentality failure rooted in stigma and therapeutic scepticism; and Valence failure rooted in optimistic bias. For each, a class of evidence-based, prevention-oriented intervention is specified and grounded in cross-national literature. The framework's bottleneck logic makes it diagnostically actionable in a way that additive and stage-based models are not: it does not tell a clinician that motivation is generally low it identifies which component is most suppressed and therefore which intervention is required.

The limitations are real and must be taken seriously. The PMF has not yet been prospectively validated. Its individualistic architecture requires modification for collectivist contexts. The components interact in ways that clinical application must account for. These are not reasons to dismiss the framework they are the research agenda it generates.

Supply-side reform has a ceiling. The PMF identifies exactly where that ceiling is. The cognitive and relational work of building Expectancy, preserving Instrumentality, and personalising Valence begins precisely where structural access ends. If health systems are serious about closing the gap between access and engagement, prevention-oriented, component-specific motivational intervention is not a peripheral add-on it is the next essential layer of health systems design.

References

1. ^a, ^bVroom VH (1964). Work and Motivation. Wiley.
2. ^Penchansky R, Thomas JW (1981). "The Concept of Access: Definition and Relationship to Consumer Satisf action." Med Care. **19**(2):127–140. doi:10.1097/00005650-198102000-00001.
3. ^World Health Organization (2010). "The World Health Report 2010: Health Systems Financing The Path to Universal Coverage." WHO Press.
4. ^a, ^bRoura M, Busza J, Wringe A, Mbata D, Urassa M, Zaba B (2009). "Barriers to Sustaining Antiretroviral Tre atment in Kisesa, Tanzania." AIDS Patient Care STDs. **23**(3):203–210. doi:10.1089/apc.2008.0129.
5. ^a, ^bWorld Health Organization (2022). "World Mental Health Report: Transforming Mental Health for All." WHO Press.
6. ^Kohn R, Saxena S, Levav I, Saraceno B (2004). "The Treatment Gap in Mental Health Care." Bull World He alth Organ. **82**(11):858–866.
7. ^a, ^bvan Ryn M, Burke J (2000). "The Effect of Patient Race and Socio-Economic Status on Physicians' Percep tions of Patients." Soc Sci Med. **50**(6):813–828. doi:10.1016/S0277-9536(99)00338-X.
8. ^a, ^bFiscella K, Franks P, Doescher MP, Saver BG (2002). "Disparities in Health Care by Race, Ethnicity, and La nguage Among the Insured." Med Care. **40**(1):52–59. doi:10.1097/00005650-200201000-00007.
9. ^Rosenstock IM (1966). "Why People Use Health Services." Milbank Mem Fund Q. **44**(3):94–127. doi:10.2307/ 3348967.
10. ^Ajzen I (1991). "The Theory of Planned Behavior." Organ Behav Hum Decis Process. **50**(2):179–211. doi:10.10 16/0749-5978(91)90020-T.
11. ^Prochaska JO, DiClemente CC (1983). "Stages and Processes of Self-Change of Smoking: Toward an Integra tive Model of Change." J Consult Clin Psychol. **51**(3):390–395. doi:10.1037/0022-006X.51.3.390.
12. ^Rogers RW (1983). "Cognitive and Physiological Processes in Fear Appeals and Attitude Change: A Revised Theory of Protection Motivation." In Cacioppo JT, Petty RE (Eds.), Social Psychophysiology: A Sourcebook (p p. 153–176). Guilford Press.
13. ^Eccles JS, Wigfield A (2002). "Motivational Beliefs, Values, and Goals." Annu Rev Psychol. **53**(1):109–132. do i:10.1146/annurev.psych.53.100901.135153.
14. ^Franco LM, Bennett S, Kanfer R (2002). "Health Sector Reform and Public Sector Health Worker Motivatio n: A Conceptual Framework." Soc Sci Med. **54**(8):1255–1266. doi:10.1016/S0277-9536(01)00094-6.

15. ^Mbindyo PM, Blaauw D, Gilson L, English M (2009). "Developing a Tool to Measure Health Worker Motivation in District Hospitals in Kenya." Hum Resour Health. **7**:40. doi:10.1186/1478-4491-7-40.

16. ^Van Eerde W, Thierry H (1996). "Vroom's Expectancy Models and Work-Related Criteria: A Meta-Analysis." J Appl Psychol. **81**(5):575–586. doi:10.1037/0021-9010.81.5.575.

17. ^Thornicroft G, Brohan E, Rose D, Sartorius N, Leese M (2009). "Global Pattern of Experienced and Anticipated Discrimination Against People With Schizophrenia." Lancet. **373**(9661):408–415. doi:10.1016/S0140-6736(08)61817-6.

18. ^Bandura A (1977). "Self-Efficacy: Toward a Unifying Theory of Behavioral Change." Psychol Rev. **84**(2):191–215. doi:10.1037/0033-295X.84.2.191.

19. ^Williams DR, Priest N, Anderson NB (2016). "Understanding Associations Among Race, Socioeconomic Status, and Health." Health Psychol. **35**(4):407–411. doi:10.1037/hea0000242.

20. a, bCorrigan PW, Druss BG, Perlick DA (2014). "The Impact of Mental Illness Stigma on Seeking and Participating in Mental Health Care." Psychol Sci Public Interest. **15**(2):37–70. doi:10.1177/1529100614531398.

21. ^Clement S, Schauman O, Graham T, Maggioni F, Evans-Lacko S, Bezborodovs N, Morgan C, Rüsch N, Brown JSL, Thornicroft G (2015). "What Is the Impact of Mental Health-Related Stigma on Help-Seeking?" Psychol Med. **45**(1):11–27. doi:10.1017/S0033291714000129.

22. ^Kalichman SC, Eaton L, Cain D, Cherry C, Pope H, Kalichman M (2006). "HIV Treatment Beliefs and Sexual Transmission Risk Behaviors Among HIV Positive Men and Women." J Behav Med. **29**(5):401–410. doi:10.1007/s10865-006-9066-3.

23. ^Levesque JF, Harris MF, Russell G (2013). "Patient-Centred Access to Health Care: Conceptualising Access at the Interface of Health Systems and Populations." Int J Equity Health. **12**(1):18. doi:10.1186/1475-9276-12-18.

24. ^Weinstein ND (1980). "Unrealistic Optimism About Future Life Events." J Pers Soc Psychol. **39**(5):806–820. doi:10.1037/0022-3514.39.5.806.

25. ^Kahneman D, Tversky A (1979). "Prospect Theory: An Analysis of Decision Under Risk." Econometrica. **47**(2):263–291. doi:10.2307/1914185.

26. a, bSlovic P (1987). "Perception of Risk." Science. **236**(4799):280–285. doi:10.1126/science.3563507.

27. ^Haggerty JL, Reid RJ, Freeman GK, Starfield BH, Adair CE, McKendry R (2003). "Continuity of Care: A Multidisciplinary Review." BMJ. **327**(7425):1219–1221. doi:10.1136/bmj.327.7425.1219.

28. ^Kristjansson E, Hogg W, Dahrouge S, Tuna M, Mayo-Chávez A, Gebremichael G (2013). "Predictors of Relational Continuity in Primary Care." BMC Fam Pract. **14**:72. doi:10.1186/1471-2296-14-72.

29. ^Glenton C, Colvin CJ, Carlsen B, Swartz A, Lewin S, Noyes J, Rashidian A (2013). "Barriers and Facilitators to the Implementation of Lay Health Worker Programmes to Improve Access to Maternal and Child Health: Qualitative Evidence Synthesis." Cochrane Database Syst Rev. (10):CD010414. doi:10.1002/14651858.CD010414.pub2.

30. ^Lorig KR, Holman HR (2003). "Self-Management Education: History, Definition, Outcomes, and Mechanisms." Ann Behav Med. **26**(1):1–7. doi:10.1207/S15324796ABM2601_01.

31. ^Galesic M, Garcia-Retamero R (2011). "Graph Literacy: A Cross-Cultural Comparison." Med Decis Making. **31**(3):444–457. doi:10.1177/0272989X10373805.

32. ^Triandis HC (1995). Individualism and Collectivism. Westview Press.

33. ^Munro SA, Lewin SA, Smith HJ, Engel ME, Fretheim A, Volmink J (2007). "Patient Adherence to Tuberculosis Treatment: A Systematic Review of Qualitative Research." PLoS Med. **4**(7):e238. doi:10.1371/journal.pmed.0040238.

34. ^Christakis NA, Fowler JH (2007). "The Spread of Obesity in a Large Social Network Over 32 Years." N Engl J Med. **357**(4):370–379. doi:10.1056/NEJMsa066082.

35. ^Rogers EM (2003). Diffusion of Innovations. 5th ed. Free Press.

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