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From disruption to re-stabilisation: Behavioural resilience in medication adherence after percutaneous coronary intervention: a grounded theory study

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Abstract

Background

Medication adherence is critical for secondary prevention after percutaneous coronary intervention (PCI). While existing research acknowledges adherence variability over time, it often overlooks the mechanisms behind these fluctuations and how adherence can be restored after disruptions. This study aims to address this gap by developing the "Behavioral Resilience" model, a grounded theoretical framework that explains the dynamic process of medication adherence post-PCI, focusing on how adherence fluctuates and how recovery can occur after disruptions.

Methods

Initial purposive sampling was used to recruit participants with variation in age, sex, and medication-taking experience, followed by theoretical sampling to refine emerging categories. Data were collected through in-depth semi-structured interviews. Data collection and analysis proceeded concurrently using constant comparison. Initial and focused coding, memo writing, and iterative category development were used to construct a theoretical explanation of the post-discharge adherence process.

Results

Forty patients participated in this study. The core category, Behavioural Resilience, conceptualized post-PCI medication adherence as a dynamic process comprising five phases: behavioural disruption, adherence withdrawal, resilience activation, behavioural recovery, and re-stabilisation. Unlike static adherence models, this study reveals how adherence fluctuates over time and can be restored after disruptions. The study identifies adherence withdrawal as a critical new phase, where repeated disruptions lead to disengagement, characterized by rationalisation, concealment, and diminished confidence. Resilience activation, a newly conceptualized phase, marks the transition from withdrawal to recovery, driven by risk salience, credible explanations, and accompaniment-oriented support. Finally, re-stabilisation highlights the capacity to resume adherence after lapses, offering a recoverable perspective on long-term adherence.

Conclusion

This study introduces the "Behavioral Resilience" model as a novel framework for understanding medication adherence post-PCI. By conceptualizing adherence as a dynamic, recoverable process, the model shifts the focus from merely preventing lapses to enhancing patients' ability to recover and sustain adherence over time. The findings underscore the importance of phase-sensitive, recovery-oriented nursing interventions that not only address the prevention of initial lapses but also actively

support patients in regaining and stabilizing adherence in the long term. This approach offers a practical and personalized strategy for improving long-term medication adherence and patient outcomes.

Clinical trial number:

Not applicable.

1. Introduction

Percutaneous coronary intervention (PCI) is a cornerstone treatment for coronary artery disease, but its long-term benefit depends heavily on sustained adherence to prescribed secondary prevention medication (Lawton et al., 2022). Antiplatelet agents, statins, beta-blockers, and other cardioprotective medicines are central to reducing recurrent cardiovascular events, stent thrombosis, rehospitalisation, and mortality. Yet adherence after PCI remains difficult to achieve and maintain (Simon et al., 2021). After discharge, patients must incorporate long-term medication taking into everyday life while managing physical recovery, symptom concerns, emotional uncertainty, competing responsibilities, and changing support (Pedretti et al., 2023). The challenge, therefore, is not only one of knowledge or instruction, but also of sustaining medication taking in the face of everyday disruptions, competing priorities, and changing support.

Research on medication adherence after PCI and other acute coronary events has identified a wide range of associated factors, including regimen complexity, side-effect concerns, insufficient knowledge, negative beliefs about medicines, low self-efficacy, limited social support, and poor continuity of care (Fang et al., 2025; Kähkönen et al., 2022). This literature has generated important knowledge about common barriers and facilitators of adherence. However, much of it continues to approach adherence as a relatively static outcome, often classifying patients as adherent or non-adherent at a particular time point, or identifying predictors of higher or lower adherence(Kha et al., 2025). While such approaches are useful for measurement and risk stratification, they are less well suited to explaining how adherence changes in everyday life, why early lapses may develop into broader disengagement, or how improvement is achieved and sustained over time. Static understandings of adherence may also constrain the development of effective support strategies, as they do not fully account for the dynamic and context-dependent nature of medication taking after PCI.

At the same time, adherence after PCI is unlikely to be adequately understood as a fixed behavioural state. Patients do not simply occupy stable categories of adherence and non-adherence. Rather, medication taking may fluctuate as routines are disrupted, bodily sensations are interpreted as signs of safety or harm, confidence rises or falls, and support becomes either workable or misaligned(Su et al., 2024). Early lapses may remain isolated, but they may also accumulate into broader disengagement. Likewise, apparent improvement may not indicate durable stability, but only a temporary period of control that remains vulnerable to further disruption. A static understanding of adherence therefore risks

obscuring both the fragility of medication-taking routines and the work required to restore them once they begin to drift(Vrijens et al., 2012).

These limitations are also evident in how non-adherence has been conceptualised. Distinctions such as intentional and unintentional non-adherence remain clinically useful, but they may not adequately capture how implementation problems, emotional responses, symptom interpretation, and relational dynamics interact across the post-discharge trajectory(De Geest & Sabaté, 2003). More broadly, previous research has more often identified what is associated with non-adherence than explained how instability develops, why disengagement deepens, or how recovery occurs once medication taking has begun to drift. As a result, important aspects of adherence remain undertheorised, particularly its dynamic, staged, and context-dependent character(Valgimigli et al., 2019).

For these reasons, a qualitative approach is well suited to addressing this gap. It can illuminate how patients experience medication taking in context and how adherence is shaped by everyday life rather than by isolated factors alone(Maher & Dertadian, 2018). A theory-generating design is especially relevant where the task is not simply to identify barriers, but to explain how medication-taking instability develops, how patients respond to that instability, and how stability may be re-established in ways that are workable in daily life(Fereidouni & Najafi Kalyani, 2019). Such an account is highly relevant for nursing, as support after PCI often requires more than education and reminders(Chow et al., 2022); it depends on understanding how medication taking is destabilised, how disengagement emerges, and how recovery may be supported over time.

Against this background, this grounded theory study explored how patients experience and navigate medication taking after PCI, with the aim of constructing a theoretical explanation of the post-discharge adherence process. The research question was: how do patients experience and navigate the process through which adherence becomes unstable and is re-established after PCI?

2. Methods

2.1. Study design

This study was guided by Charmaz's constructivist grounded theory(Chun Tie et al., 2019) and is reported in accordance with the COREQ checklist(Tong et al., 2007). Grounded in a relativist ontology and constructivist epistemology, this approach assumes that data and meanings are co-constructed through researcher–participant interaction(Bobbink et al., 2024). It was therefore well suited to developing an interpretive explanation of how medication adherence after PCI becomes unstable, how disengagement develops, and how stability is re-established in everyday life. The research team's clinical and research expertise in cardiovascular secondary prevention was treated as a sensitising resource, while constant comparison, memo-writing, and regular analytic discussions were used to interrogate interpretations and maintain grounding in participants' accounts.

2.2. Researcher reflexivity

Consistent with constructivist grounded theory, researchers' disciplinary backgrounds and professional positioning were understood to shape data generation and interpretation(Charmaz, 2017). The first author, who conducted the interviews, was trained in nursing and was a master's-level researcher in cardiovascular nursing. The wider team included members with clinical and research experience in cardiology and coronary heart disease nursing. While this expertise supported contextual understanding of post-PCI medication management, it also risked privileging familiar clinical explanations if not critically examined.

Reflexivity was embedded throughout the study(Olmos-Vega et al., 2022). The interviewer was not a member of the participants' direct treatment team or their primary nurse, which helped reduce role-related pressure and support more open discussion(Charmaz & Thornberg, 2021). Open-ended interviewing, reflexive memos, and regular team discussions were used to examine assumptions, question early interpretations, compare competing explanations, and refine categories through constant comparison and attention to cases that complicated early assumptions(Charmaz, 2015; Charmaz & Thornberg, 2021). This process helped sustain analytic openness to the staged, relational, and recoverable character of adherence described by participants.

2.3. Setting

The study was conducted in Changsha, Hunan Province, China, with recruitment from a large tertiary hospital. Participants were identified through the hospital's Chest Pain Center and Interventional Cardiology Center, including the catheterisation laboratory and cardiology inpatient wards. Post-discharge follow-up and medication management were provided through the cardiology outpatient clinic.

2.4. Sampling and sample size

Sampling followed the logic of constructivist grounded theory(Charmaz, 2014). Initial purposive sampling was used to recruit information-rich post-PCI patients with variation in age, sex, time since PCI, and medication-taking experience. As analysis progressed, theoretical sampling was used to elaborate and challenge emerging categories. Guided by ongoing analysis, later recruitment sought participants with differing daily routines, symptom experiences, medication burden, and family support arrangements to compare how developing processes unfolded across contrasting cases and to refine category boundaries. For example, when early analysis suggested that adherence difficulties were shaped by the interplay of routine instability, symptom interpretation, and support, subsequent recruitment included participants with contrasting work schedules, symptom experiences, and support arrangements, and later interviews probed these differences in greater depth. A total of 40 participants were interviewed. Recruitment ceased when additional interviews added nuance but did not substantially extend the analytic categories or alter their interrelationships, indicating theoretical sufficiency.

2.5. Participants and recruitment

Eligible participants were adults aged ≥ 18 years who had undergone PCI at the study hospital, were prescribed secondary prevention pharmacotherapy at discharge, were able to communicate in Chinese,

and could provide informed consent. Exclusion criteria were severe cognitive impairment or diagnosed psychiatric disorders, acute clinical instability, and hearing, speech, or other communication barriers identified from records or initial contact.

Potentially eligible patients were identified through the PCI registry or procedure log and inpatient admission–discharge records. A trained research assistant contacted patients by telephone to introduce the study and invite participation. Those interested were contacted by the researcher to answer questions and arrange a mutually convenient interview. On the interview day, the information sheet was reviewed again and written informed consent was obtained before the interview. Seven patients declined participation because of work schedules or lack of interest.

2.6 Data collection

Data were collected through semi-structured, in-depth interviews informed by constructivist grounded theory(Chun Tie et al., 2019). The interview guide was developed from a targeted literature review and the research team's clinical experience in cardiovascular secondary prevention, and was refined during early interviews to support theoretically informed probing while remaining responsive to participants' narratives (Supplementary File 1). Interviews were conducted in Chinese at a mutually agreed time and venue, usually in a private room in the cardiology outpatient clinic or ward, lasted approximately 45 minutes, and were audio-recorded with consent. Recordings were transcribed verbatim, de-identified, and supplemented with field notes.

Data collection proceeded iteratively alongside analysis (Moser & Korstjens, 2018). As categories developed, subsequent interviews more actively explored concrete episodes of disruption, missed doses, symptom interpretation, support interactions, concealment, and attempts to resume or stabilise medication-taking in daily life. Emerging analytic insights informed both subsequent questioning and theoretical probing, consistent with constant comparison and theoretical sampling. Selected quotations were translated into English by bilingual team members familiar with clinical and nursing terminology and independently reviewed by a second bilingual reviewer with experience in qualitative health research. Differences in phrasing were resolved through discussion to preserve semantic equivalence while improving clarity(Yunus et al., 2022).

2.7 Data analysis

Data were analysed using constant comparison consistent with Charmaz's constructivist grounded theory(Charmaz, 2017). Transcripts were checked against the audio-recordings for accuracy. Two members of the research team independently reviewed a subset of transcripts and discussed discrepancies in regular analytic meetings. Data were managed and coded in NVivo 12.

Analysis proceeded through initial, focused, and theoretical coding(Moser & Korstjens, 2018). In initial coding, transcripts were examined line by line using action-oriented, gerund-based codes. In focused coding, recurrent and analytically significant codes were compared across cases and developed into higher-level categories. Theoretical coding was then used to specify relationships among categories and

integrate a process-oriented explanatory model. Constant comparison, memo-writing, and diagramming were used throughout to examine category properties, boundaries, and interrelationships. Attention was given not only to common phase patterns but also to cases that appeared to move directly between phases, loop back across phases, or oscillate between instability and recovery, and these comparisons were used to refine the model's non-linear character. Deviant cases were actively sought to challenge early interpretations, and the core category was identified on the basis of its explanatory reach and integrative capacity. Recruitment ceased at theoretical sufficiency.I llustrative coding examples and the analytic development from codes to categories are provided in Supplementary File 2 and Supplementary File 3.

3. Results

Forty post-PCI patients were included. The sample showed variation in demographic and medication-related characteristics, including age, sex, educational level, employment status, time since PCI, medication regimen complexity, and family caregiving support. Participant characteristics are presented in Table 1.

The core category was conceptualised as Behavioural Resilience. The findings identified five analytically distinct but dynamically related phases in post-PCI medication adherence: Behavioural disruption, adherence withdrawal, resilience activation, Behavioural recovery, and re-stabilization (Fig. 1). Across accounts, these phases most often formed an overall trajectory from disruption to re-stabilization, although participants' experiences did not always proceed in a rigid step-by-step sequence.

Table 1
Demographic and clinical characteristics of the participants (n = 40)

Demographic and clinical characteristics	Parameters
	n (%) or mean ± SD
Age, years, mean ± SD	62.13 ± 8.09
Sex	
Male	28 (70.0)
Female	12 (30.0)
Educational level	
Primary school or below	10 (25.0)
Junior middle school	13 (32.5)
High school/technical secondary school	12 (30.0)
College or above	5 (12.5)
Employment status	
Employed	13 (32.5)
Retired	25 (62.5)
Self-employed/flexible employment	1 (2.5)
Homemaker/unemployed	1 (2.5)
Time since PCI, months, mean ± SD	12.78 ± 9.69
Number of prescribed medication categories, mean ± SD	5.73 ± 1.11
Family caregiver	
Yes	29 (72.5)
No	11 (27.5)
Note: Values are presented as n (%) unless otherwise indicated.	

Abbreviation: PCI, percutaneous coronary intervention.

3.1 Behavioural Disruption

3.1.1 Routine fragmentation and competing priorities

After discharge, medication taking was often disrupted by fragmented routines and competing role demands. Work tasks, caregiving responsibilities, and time-bound commitments displaced planned

dosing times and made recovery difficult once the original window had passed. Participants described this less as a deliberate decision than as gradual slippage, in which brief deferral became harder to correct as the day accelerated.

“Mornings are the easiest to get disrupted. Meetings run back to back. Once the day starts moving, it is hard to find the right moment again.” (P01)

“When orders keep coming one after another, I can only deliver first. I only remember the medication after the scheduled time has passed.” (P15)

3.1.2 Cognitive overload and regimen complexity

Medication taking was also disrupted by cognitive overload and regimen complexity. Multiple medications, timing rules, and uncertainty about missed-dose management increased decision friction and delayed execution. Across accounts, complexity turned adherence into a verification task, and repeated checking often displaced timely action.

“The busier I am, the more I fear taking it wrong, so I keep double checking. But that delays me. By the time I finally confirm, the time window has already passed.” (P10)

“When my memory is not good, I am not sure whether I have taken it. The more uncertain I am, the more anxious I get. I am afraid of double dosing and I am also afraid of missing it.” (P23)

“There are too many pills and the names look similar. I am afraid of taking the wrong one, so I delay and wait until my daughter comes to confirm.” (P08)

3.1.3 Emerging concerns about harm and bodily signals

Medication taking was commonly disrupted by emerging concerns about harm and heightened attention to bodily signals. Symptoms such as bleeding, muscle pain, or gastrointestinal discomfort were often interpreted as medication-related harm, prompting hesitation and delay. In some cases, bodily sensations themselves triggered concern; in others, stories from relatives or fragmented information amplified suspicion and shifted decisions toward short-term safety appraisal.

“Sometimes when my gums bleed while brushing my teeth, I get nervous right away and suspect it might be due to the medication. Then I am even less willing to take that dose.” (P12)

“When my muscles start hurting, I think maybe it is the medicine doing it, and then I want to stop for a while. It is not that I do not worry about it happening again, but at that moment the side effects are what I am thinking about more.” (P38)

3.1.4 Thin support and misaligned reminders

Medication taking was also disrupted when external support failed to provide timely, workable assistance. Participants described reminders that were fragile, mistimed, or non-actionable, as well as support that was absent or experienced as pressure rather than help.

"I am not good at using phone reminders. If I lose the note, everything becomes chaotic. Without a stable way to catch me and keep the reminder going, it is easy for me to miss doses." (P14)

"I cannot hear the alarm, so I miss the timing. By the time I remember, it is already late." (P29)

"The more my son pushes me, the more irritated I get, and the less I want to take it right then." (P20)

3.2 Adherence Withdrawal

3.2.1 Rationalising disengagement

Some participants described explaining away lapses in ways that made nonadherence feel temporary and relatively harmless. Rather than presenting missed doses as an intentional decision to stop treatment, they described everyday self-justifications that reduced guilt and made slippage easier to repeat.

"Sometimes I feel quite okay, and if I miss one dose, I just think, well, it is probably fine this once." (P05)

"When work gets really busy, I just think missing it once is probably not a big deal, especially if I feel fine. I tell myself I will be more careful tomorrow, and then it sort of passes like that." (P13)

"There were times when I thought maybe I could stop it for a day and just see what happened. In my head, it was only one day, so it did not seem like that big a deal." (P22)

3.2.2 Avoidance and concealment

Avoidance and concealment formed another aspect of withdrawal. Participants described giving vague answers to family members, hiding missed doses, or not disclosing problems to clinicians because they anticipated worry, criticism, or conflict. Although concealment reduced interpersonal strain in the short term, it also limited opportunities for clarification and timely correction.

"When my family asks if I took the medicine, sometimes I just answer vaguely. I do not want them to worry, and I also do not want them to keep going on about it." (P02)

"My wife asked if I had taken the pills, and I said yes even though I had not. I just did not want to start that whole conversation again." (P07)

"I do not really want the doctor to know I missed doses. It just feels like they will think I have not been managing it well, and I do not really want to hear that." (P18)

3.2.3 Eroded self-efficacy and depleted motivation

Repeated disruption also eroded participants' confidence in their ability to sustain adherence over time. Missed or delayed doses, unstable routines, and repeated failed attempts to regain control contributed to discouragement and a reduced willingness to keep investing effort in medication taking. Across accounts, withdrawal was characterised less by active refusal than by reduced confidence, emotional strain, and declining motivation to re-engage.

"After missing it a few times, I start feeling unsure. I kind of think, can I really keep doing this for that long? And once I start thinking like that, I get much more passive about it." (P03)

"I keep getting it wrong, and after a while it feels like nothing I do can make it stable. That really gets to me." (P08)

"Sometimes my mood gets low, and I think this really should not be so hard. When I get into that state, I just do not feel like trying so hard to keep it up anymore." (P30)

3.2.4 Social withdrawal and reduced help-seeking

As adherence became more unstable, some participants also described pulling back from support and delaying help-seeking. They hesitated to contact clinicians, avoided repeated questions, and often tried to manage missed doses or side effects through self-guessing. Although this reduced interactional discomfort, it also prolonged uncertainty.

"I rarely ask. Part of it is that it feels troublesome, and part of it is that I am not even sure whether this is the kind of thing I should be asking about." (P24)

"I do not really want to keep asking the doctor. I know they are busy, so most of the time I just try to work out the medication myself." (P11)

"I did not want to bother people, so even when I was not completely sure what to do after missing the pills, I still tried to sort it out on my own first." (P34)

3.3 Resilience Activation

3.3.1 Salience of risk and wake-up moments

Participants described wake-up moments in which cardiovascular risk became immediate and difficult to dismiss. These moments were triggered by abnormal follow-up results, clinician warnings, or witnessing adverse events in others, and they reoriented attention toward the consequences of being casual about medication.

At follow-up, the doctor said some results were not very good, and that really made me tense. I just felt, no, I cannot keep being this casual about the medicine." (P21)

“When the check-up did not look good, that really woke me up. After that, I did not dare be careless with the medication anymore.” (P27)

“I saw a colleague go back into hospital again, and that hit me hard. I thought I really cannot just rely on luck.” (P07)

3.3.2 Credible explanation and sense-making

Adherence became more actionable when participants received explanations they regarded as credible and practically useful. They valued clear information about why specific medicines mattered, which parts of the regimen were non-negotiable, and how to respond to missed doses or side effects. This reduced uncertainty and shifted decisions away from guessing toward more rule-based medication taking.

“The doctor explained very clearly which medicines I really could not stop casually and what I should do if I missed a dose. Once I understood that, I felt much more sure, like I knew what I was supposed to do.” (P09)

“Before, I was mostly just guessing. Later the doctor explained which situations were serious and which were not, and after that I felt I could just follow the rules instead of trying to figure it out myself.” (P14)

“Before, I only knew I was supposed to take the medicine. Later, when someone explained what each pill was for, I felt much less confused and more willing to keep taking them.” (P10)

3.3.3 Vicarious learning and normalisation

Learning through others also supported re-engagement. Observing peers, colleagues, or other patients helped normalise disruption, reduced self-blame, and provided practical strategies for carrying out medication taking in daily life.

“In the group, I saw how other people sorted their pills and set reminders. I realised everyone gets disrupted sometimes, so I stopped blaming myself so much.” (P02)

“A co-worker told me to put the medicine next to my lunch box. That way, when I see the lunch box, I remember the pills too.” (P13)

“When I heard that other people also forgot sometimes but still found ways to deal with it, I felt less like I had failed and more like this was something I could still sort out.” (P25)

3.3.4 Re-aligning support toward accompaniment

Support became more effective when it shifted away from surveillance and pressure and toward accompaniment, practical help, and shared problem-solving. Participants described reduced resistance when family members prepared medicines, embedded reminders into everyday routines, or used a more collaborative tone.

“My wife does not push me. She sorts the pills and puts them on the table, then just reminds me casually when we eat, and that makes me much more willing to take them.” (P03)

“My partner does not scold me anymore. She puts the medicine out in advance and reminds me naturally at mealtimes, so it does not feel like pressure now.” (P17)

“They slowly stopped checking on me all the time and started helping me get things ready instead. Once it became cooperation, taking the medicine felt much easier.” (P19)

3.4 Behavioural Recovery

3.4.1 Tooling and planning for execution

Behavioural recovery involved rebuilding execution through practical tools and plans that reduced reliance on memory and willpower. Participants described using pill organisers, checklists, portable packs, and pre-sorting strategies to simplify action under real-life conditions.

“I put the pills into a small box I can carry with me, so even if I go out for dinner or my schedule changes, I can still find a moment to take them.” (P07)

“Now I use both a pill box and a checklist. Before I leave in the morning, I look once and can tell clearly whether I have already taken the medication.” (P18)

“I divided the medicines into compartments. Then I just take what is in that compartment instead of standing there thinking again and again about which pill is which.” (P08)

3.4.2 Habit-linking and environmental anchoring

Participants also described stabilising medication taking by linking it to familiar routines and visible environmental cues. Dosing was attached to waking up, brushing teeth, eating meals, or other predictable transitions, while medicines were placed where they would be encountered at the right moment.

“I link taking the medicine to brushing my teeth. Once I wash up, I just take it straight after, so I do not have to keep reminding myself again.” (P04)

“I tie it to the first thing after waking up. I drink water and take the pills before I start doing anything else.” (P11)

“I put it right next to the water cup, so whenever I pour water, I see the medicine at the same time.” (P29)

3.4.3 Contingency strategies and error recovery

Recovery also involved contingency strategies that prevented routine disruption from turning into prolonged nonadherence. Participants kept backup medication in bags or cars, packed in advance for

travel, and planned for likely schedule changes. Across accounts, resilience was enacted through preparedness and rapid recovery after interruption.

“I bring a backup set when I go out. Even if my schedule changes suddenly, I can still keep the medication going and not let the whole routine break.” (P05)

“I keep a fixed set in the car. If the route changes or something unexpected happens, I do not have to panic about missing the pills.” (P09)

“Even if travelling disrupts the usual routine, I pack the medicine in advance and carry it with me, so I can pick it up again wherever I am.” (P26)

3.4.4 Feedback-driven mastery and confidence rebuilding

Follow-up results, bodily stability, and successful routine performance reinforced recovery by providing evidence that adherence efforts were worthwhile. Participants described becoming more confident when they saw improvement and recognised that their strategies were working.

“Later, my check-up results improved a little, and that reassured me. I felt that continuing with the medication really was doing something.” (P02)

“When the follow-up looked better, I felt more confident. I thought maybe I really could keep this going after all.” (P25)

“When you can actually see that taking the medicine properly leads to better results, it is much easier to keep going.” (P21)

3.5 Re-stabilization

3.5.1 Automaticity and low-burden maintenance

Over time, medication taking became more automatic, less effortful, and less mentally intrusive for some participants. Stable cues, repeated practice, and simplified routines reduced cognitive load so that adherence no longer depended on constant vigilance or external prompting.

“Now when it is time, I remember it myself. Taking medication is a bit like eating now. I do not need someone standing there watching me anymore.” (P03)

“Usually I can remember without alarms now. When the time comes, I just take the medicine naturally.” (P13)

“It feels much lighter than before. Earlier I had to keep the medication in mind all the time, but now it is just part of the day.” (P08)

3.5.2 Identity alignment and self-responsibility narrative

Re-stabilization also involved a shift in how participants understood medication taking. Adherence was increasingly framed as part of self-care and personal responsibility rather than a task enforced by others, giving medication taking a more durable meaning.

"Now I remind myself that this is my own responsibility. I am not taking the medicine just because other people say I should. I am doing it for myself." (P20)

"Now I see it as something I should do for myself, so I do not need other people to keep watching me." (P31)

"Before, it felt more like something other people were telling me to do. Now it feels more like part of how I take care of myself." (P24)

3.5.3 Recalibrated relationships and sustainable support

Medication taking was more likely to remain stable when family relationships and support practices became more sustainable. Participants described how early support could be tense and monitoring-oriented, whereas later support became more collaborative, practical, and acceptable. Across accounts, sustainable support reduced conflict, protected autonomy, and made adherence more manageable over time.

"Later, my family stopped only pushing me and started arranging the medication with me. It felt much less tense, and I could follow it more steadily." (P26)

"We used to argue about the medicine quite often. Later, we started preparing it together, and the conflict eased off a lot." (P19)

"When support changed from checking on me to helping me get things ready, I felt less resistant. Taking the pills became something we could keep doing over time." (P17)

3.5.4 Resilient cycling under new disruptions

Even after routines had re-stabilized, disruptions still occurred. What changed was how participants interpreted and managed them. Rather than treating a lapse as failure, they were more likely to apply repair strategies, resume the routine quickly, and prevent one missed dose from expanding into prolonged drift.

"Even if I get disrupted sometimes, I know how to bring the medication routine back. I do not stay in a mess for a long time like before." (P32)

"Even if I miss one dose, I can get back on track quite quickly now. I do not just give up because of that one time." (P21)

“Now if something unexpected happens, I do not panic the way I used to. I just think about how to get back to the routine as soon as I can.” (P36)

4. Discussion

This study is the first to conceptualize post-PCI medication adherence as 'Behavioural Resilience', presenting it as a dynamic and recoverable process through which patients move through phases of behavioural disruption, adherence withdrawal, resilience activation, behavioural recovery, and re-stabilisation. Thus, adherence after PCI is better understood not as a fixed attribute or binary state, but as a fluctuating stability in medication-taking, shaped by the interplay of everyday demands, embodied experiences, and relational contexts. In this regard, the findings extend conventional barrier–facilitator models by demonstrating not only how adherence becomes destabilised and disengagement unfolds, but also how stability can be regained over time.

Positioning the core category in relation to resilience literature further clarifies its meaning. Behavioural Resilience in this study does not refer to a stable psychological trait or a general capacity to withstand adversity. Rather, it describes a dynamic and situated capacity to restore medication-taking after disruption, reduce the likelihood that lapses will develop into sustained disengagement, and re-establish a workable pattern of adherence under recurrent disturbance (Bergeman & Nelson, 2024). The concept overlaps with, but is not reducible to constructs such as self-efficacy, coping, or self-regulation, encompassing broader adaptive responses such as practical problem-solving and confidence. The term resilience, thus, captures not only persistence but also recoverability—the ability to resume and re-stabilise medication-taking once disruption has occurred (Masten, 2007).

In this study, non-adherence did not manifest as a fixed distinction between intentional and unintentional non-adherence, but rather as part of a broader trajectory. Early difficulties often began as implementation problems embedded in everyday life, such as competing priorities, regimen complexity, uncertainty about missed doses, and concern about potential harm (Kvarnström et al., 2021). When these difficulties were not resolved with timely clarification or support, they led to rationalisation, concealment, diminished confidence, and reduced help-seeking (Dang et al., 2023). Withdrawal thus appeared less as an abrupt rejection of treatment and more as a cumulative process of disengagement (Alodhailah et al. 2025). Resilience activation marked a turning point, where re-engagement became more likely when cardiovascular risk became difficult to dismiss, when patients received credible and practically useful explanations, when others’ experiences normalised difficulties, and when support shifted from surveillance towards accompaniment (El-Komy et al., 2025; Guo et al., 2025). Recovery and re-stabilisation should not be collapsed into a single process. Recovery involved active restoration of medication-taking, while re-stabilisation reflected the consolidation of a more sustainable and lower-burden routine. Behavioural Resilience was thus expressed not in perfect adherence, but in the capacity to recover and re-stabilise despite recurrent disturbances.

This process-oriented interpretation can also be distinguished from several established adherence models. Frameworks such as COM-B, the Health Belief Model, and the Necessity–Concerns Framework remain valuable for identifying behavioural determinants, perceived threat, and treatment-related beliefs (Foot et al., 2016; Janz & Becker, 1984; Michie et al., 2011). Parts of the present findings can be read through these lenses. Regimen complexity and uncertainty about missed doses relate to capability, risk salience and side-effect concerns to motivational and belief-based processes, and family reminders and service access to opportunity (Kvarnström et al., 2021). However, these models more often clarify why adherence may be strengthened or undermined than how instability unfolds over time, accumulates into disengagement, or is subsequently recovered. They are especially less able to account for how the same influence may change in meaning and function across phases, such as bodily symptoms initially amplifying hesitation but later being reorganised through credible explanation, or family support operating first as pressure and later as accompaniment. The present analysis therefore adds a more explicitly temporal, staged, and recoverable account of post-PCI medication taking.

The findings are deeply embedded in the sociocultural context in which they were generated, reflecting how these social and cultural dynamics influence medication adherence. This study was conducted in a large tertiary hospital in China, where medication-taking after PCI is deeply embedded in family involvement, influenced by broader clinician–patient power dynamics typical of the Chinese healthcare system (Li, 2025). In this context, avoidance and concealment of non-adherence may serve relational functions, such as limiting family worry, avoiding interpersonal tension, or preventing anticipated disapproval from clinicians (Chen et al., 2026; Xu & Yuan, 2024). The apparent effectiveness of accompaniment-oriented support may reflect the cultural salience of family responsibility in illness management. Family involvement was not just a background resource, but an active participant in how adherence was organised and sustained post-discharge. However, the findings suggest that support may become counterproductive when family responsibility manifests through surveillance or pressure, particularly for adult patients striving to preserve autonomy (Stawnychy et al., 2021).

Understanding post-PCI medication adherence as a staged and recoverable process has significant implications for nursing practice and intervention design. Because the model differentiates phases of instability, withdrawal, activation, recovery, and re-stabilisation, it suggests that a single support strategy may not be effective across all stages (Stawnychy et al., 2021). Instead, post-discharge support should be tailored to the patient's position within the adherence trajectory, with intervention content and intensity adapted to changing patterns of risk, disengagement, and recovery over time (Hou et al., 2025). In the early instability phase, nursing support can focus on simplifying regimen understanding, offering clear guidance on missed-dose management, and helping patients anchor medication-taking to stable daily routines (George et al., 2026). As withdrawal emerges, follow-up care should include non-judgmental inquiries about missed doses, concealment, uncertainty, and reduced help-seeking, to identify disengagement before overt discontinuation. During recovery, support should prioritise providing credible explanations, collaborative problem-solving, and low-burden execution systems such as cue-based planning, portable medication arrangements, or contingency strategies for disrupted routines (Robinson et al., 2024). In the re-stabilisation phase, nursing care should focus on reinforcing

sustainable routines, boosting patient confidence in resuming medication-taking after lapses, and shifting family support from surveillance towards accompaniment (George et al., 2026). Clinical assessment should extend beyond simply whether doses were missed, to evaluating whether routines are becoming fragile and if patients are still able to recover from disruption (Burnier, 2024).

5. Strengths and Limitations

This study provides a process-oriented theoretical explanation of post-PCI medication adherence, conceptualising Behavioural Resilience as a dynamic and recoverable pattern of medication-taking post-discharge. The findings extend static adherence classifications by demonstrating how instability, disengagement, recovery, and re-stabilisation unfold in everyday life, highlighting the practical, relational, and interpretive dimensions of adherence after PCI.

Several limitations should be considered. The phases identified are analytic distinctions rather than strictly linear sequences, and trajectories may overlap or recur in practice. The study was conducted in a large tertiary hospital in China, where patients may receive more intensive follow-up and specialist guidance than those in lower-level settings. Some triggers of resilience activation, such as specialist explanations and structured follow-up, may not be reproducible across different healthcare settings within China or in other sociocultural contexts. Additionally, the analysis primarily relied on retrospective accounts from patients, which may not fully capture all aspects of medication-taking or family interactions in everyday life. The proposed model is explanatory rather than predictive, and further qualitative and longitudinal studies are needed to examine its applicability across other settings.

5. Conclusion

This study conceptualizes post-PCI medication adherence as Behavioural Resilience, a dynamic, recoverable process that emerged from the data. Instead of viewing adherence as a fixed state, the model highlights how patients navigate phases of disruption, withdrawal, activation, recovery, and re-stabilisation. These findings suggest that adherence is not a simple binary between adherence and non-adherence but a fluid process that evolves over time. The study's results emphasize that supporting post-PCI adherence involves more than preventing lapses. It also requires strengthening patients' ability to recover when disruptions occur, a capacity that is influenced by the interplay of personal, relational, and contextual factors. The findings call for phase-sensitive interventions that respond to patients' changing needs throughout the process, focusing on recovery and re-stabilisation rather than solely preventing initial disruptions.

Abbreviations

COM-B: Capability, Opportunity, Motivation–Behaviour
COREQ: Consolidated Criteria for Reporting Qualitative Research
PCI: Percutaneous coronary intervention
SD: Standard deviation

Declarations

Ethical considerations

Ethical approval was obtained from the Scientific and Ethics Committee of Changsha Medical University (Approval No. X2025186). The study was conducted in accordance with the Declaration of Helsinki(Association, 2013). All participants provided written informed consent prior to participation and were informed that participation was voluntary and that they could decline any question or withdraw at any time without affecting their care. To protect confidentiality, data were de-identified and participants are referred to using numerical codes; audio files and transcripts were stored securely with access restricted to the research team.

Consent for publication

All authors confirm their consent for publication.

Data availability

Data sets are available on reasonable request to the corresponding author.

Declaration of competing interest

All authors declare no conflicts of interest.

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CRediT authorship contribution statement

Yong Fang: Writing - review & editing, Writing - original draft, Methodology, Investigation, Formal analysis, Data curation, Conceptualization. **Wei Lai:** Writing - review & editing, Project administration, Investigation, Formal analysis, Conceptualization. **Zhihao Han:** Writing - review & editing, Supervision, Methodology, Conceptualization. **Wenxiao Wu:** Writing - review & editing, Writing - original draft, Validation, Project administration, Investigation, Formal analysis, Data curation. **Xi Zhou:** Writing - review & editing, Project administration, Conceptualization.

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Figures



Figure 1

The Theory of Behavioural Resilience.

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