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An Integrated Operational Definition and Conceptual Model of Asthma Self-Management in Teens

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Abstract

Objectives—A previous definition of adolescent asthma self-management was derived from interviews with clinicians/researchers and published literature; however, it did not incorporate perspectives of teens or parents. Therefore, we conducted in-depth interviews with teens and parents and synthesized present findings with the prior analysis to develop a more encompassing definition and model.

Methods—Focal concepts were qualitatively extracted from 14-day self-management voice-diaries (n=14) and 1-hour interviews (n=42) with teens and parents (28 individuals) along with concepts found in the previous clinical/research oriented analysis. Conceptual structure and relationships were identified and key findings synthesized to develop a revised definition and model of adolescent asthma self-management.

Results—There were two primary self-management constructs: *processes* of self-management and *tasks* of self-management. Self-management was defined as the iterative process of assessing, deciding and responding to specific situations in order to achieve personally important outcomes. Clinically relevant asthma self-management tasks included monitoring asthma, managing active issues through pharmacologic and non-pharmacologic strategies, preventing future issues, and communicating with others as needed. Self-management processes were reciprocally influenced by intrapersonal factors (both cognitive and physical), interpersonal factors (family, social and physical environments), and personally relevant asthma and non-asthma outcomes.

Conclusion—This is the first definition of asthma self-management incorporating teen, parent, clinician, and researcher perspectives, which suggests that self-management processes and behaviors are influenced by individually variable personal and interpersonal factors, and are driven by personally important outcomes. Clinicians and researchers should investigate teens' symptom perceptions, medication beliefs, current approaches to symptom management, relevant outcomes, and personal priorities.

Keywords

Adolescent; Asthma; Concept-Analysis; Qualitative; Self-management; Theory

Introduction

It is estimated that up to 10% of U.S. adolescents have asthma, and despite the availability of national guidelines for effective preventive care, the majority are not well-controlled [1]. Teens with poorly controlled asthma are at high risk for ongoing morbidity, poorer quality of life, and increased rates of depression and drug use [2, 3]. Based on close association with many asthma outcomes, self-management has emerged as a key area for clinical and research intervention [4]. Yet existing literature is ambiguous as to precisely what asthma self-management entails, and what is considered “effective.” Thus, a common consensus definition of the term is needed to enhance communication through shared understanding, improve measurability, and clarify areas for potential intervention [5].

In recent years, there have been some attempts to define self-management [6–9]. As a broader concept, it has been described as “the day-to-day management of chronic conditions by individuals over the course of an illness,” [10] and in the asthma literature as “the behaviors that patients use to manage disease...involving a number of tasks in multiple areas to prevent and manage symptoms” [4]. These definitions, while contributing to general understanding, lack needed specificity. They do not delineate specific tasks, nor do they reflect the well-established influences of individual, cognitive, or societal factors. Yet evidence indicates that these factors are inseparably intertwined with self-management [11–16]. Thus, in searching for a more encompassing definition of asthma self-management, it is important to identify not only behaviors and tasks, but also the key interacting factors that influence self-management behaviors [17].

Previously, we conducted a concept analysis of adolescent asthma self-management based on use in the scientific literature and how clinicians and researchers used the term in practice [18]. From this, we developed a preliminary operational definition and model that aligned closely with Social Cognitive Theory [19], where adolescent self-management was defined as:

“...the set of behaviors that adolescents use to prevent, monitor, manage, and communicate asthma symptoms with others for the purpose of controlling individually relevant outcomes, and that is influenced by complex, reciprocally interacting intrapersonal and interpersonal factors.” (Mammen & Rhee, 2012, p185-6)

This was the first clear breakdown of adolescent asthma self-management published in the literature. While a solid first step, we felt there were gaps in the original model, as it represented clinician and researcher’s perspectives without accounting for those of teens or parents. To develop a maximally useful definition, we felt it was essential to incorporate the views of all major stakeholders—in this case teens and parents, as well as clinicians and researchers. Thus, we conducted a qualitative descriptive study of teens’ and parents’

perceptions and experiences of asthma self-management (Teen Experiences of Asthma study) [20, 21]. The specific aim was to understand how teens managed their asthma and what was important from the perspective of teens and parents. Interview data were first analyzed, and findings from the present and prior concept analysis then compared and synthesized to develop a revised model and definition reflecting teen, parent, clinician, and researcher perspectives of asthma self-management.

Methods

This study was approved by the University of Rochester Institutional Review Board. All subjects were appropriately consented.

Subjects, setting, sample

Fourteen teen-parent dyads (28 individuals) were purposefully selected for equal distribution of minority versus non-minority status and uncontrolled versus well-controlled asthma, until data saturation was achieved [22, 23]. Participants were recruited from a variety of clinical and community sites and resided in Rochester. Eligibility criteria were: English speaking, teen age 13-17 years, with diagnosis of persistent asthma, and no confounding co-morbidities (e.g. cardiac, respiratory, or psychiatric).

Data collection

Data were collected through a series of 1-hour in-home interviews (two per teen, one per parent) and 14-day voice-diaries in which teens reported on their asthma symptoms and self-management. Interview questions for teens and parents explored perceptions and experiences of asthma self-management, beginning with broad questions and concluding with questions derived from the original conceptual model. Voice-diaries were used to capture concurrent asthma self-management experiences. Demographics included age, sex, race/ethnicity, asthma severity and control using Expert Panel Report 3 (EPR3) criteria [24], household income, and insurance type.

Data analysis

We used the three step process proposed by Walker and Avant (2011) for theory synthesis: (1) specifying focal concepts; (2) defining relational statements between focal concepts and related factors; and (3) constructing an integrated theoretical representation [17]. A total of 42 transcribed interviews (28 teen; 14 parent) and 14 voice-diaries were analyzed using *Atlas.ti* and *Xmind* [25, 26]. First, open and process coding techniques were used to develop key concepts and themes within teen and parent data [27]. Transcripts were next recoded using the *a priori* concepts identified in the original model (Figure 1) [28]. Data and codes were analyzed for similarities and differences to develop a list of focal concepts. Second, all codes were imported into data mapping software (*Xmind*) and analyzed for patterns and relationships among key concepts [27, 29, 30]. This included grouping codes by relatedness, merging, and super coding to refine categories and develop the conceptual structure. Last, key findings from the present and prior analysis were synthesized to develop the revised definition and conceptual model. Substantiating quotes are marked with numeric identifiers and “T(age/sex)” for teens, or “P” for parent.

Results

Demographics

The mean age for teens was 14.79 years (SD 1.48, range 13-17 years), and 41.36 years (SD 5.83) for parents. Racial composition for teens and parents, respectively, was White (35.7%; 57.1%), Black (28.6%; 42.9%), Multiracial (28.6%; 0%), and Hispanic/Latino (7.14%; 0%). Asthma severity was classified as mild (21.4%), moderate (57.2%), and severe persistent (21.4%) by EPR3 criteria [24]. Mean annual household income was 60,000 (SD 39,170; range 10,000 to >100,000), with half of families being low-income and on Medicaid [31].

Key Findings

Self-management data were differentiated into two primary constructs: *processes* of self-management and *tasks* of self-management, as shown in Figure 2. *Self-management processes* consistently followed a three-step ASSESS—DECIDE—RESPOND pattern throughout all narratives. The iterative nature of this process was markedly evident in voice-diary data (Table 1), where teens recorded succinct daily reports of asthma experiences and self-management choices. In contrast to the consistent pattern of self-management processes, *self-management tasks* were actions teens took to assess and respond, and which varied widely depending on situation and desired outcomes. Specific tasks of assessing and responding included monitoring symptoms, managing active issues, preventing future issues, and communicating as needed.

In addition to the processes and tasks, three related conceptual categories were identified as reciprocally interacting with self-management: intrapersonal factors, interpersonal factors, and outcomes. *Intrapersonal factors* included personal values and priorities, beliefs, attitudes/feelings, perceptions, knowledge, and age-specific cognitive factors. *Interpersonal factors* consisted of family, social, and physical environments. *Outcomes* included a range of personally important outcomes not commonly recognized by the medical community, as well as disease-specific clinical outcomes. The coding schema used to derive categories and components is shown in Figure 2; substantiating quotes are presented in Tables 2 to 4.

1. Self-management Processes and Tasks

Assess: In deciding what to do, teens evaluated and monitored signs and symptoms of asthma, the context in which these occurred, and prior or anticipated outcomes, as shown in Table 2. This usually consisted of self-assessment (14/14; 100%) that was shared with parents if symptoms were unusual (12/14; 86% teens). None of the teens used symptom diaries, and only one recalled ever even having a peak flow meter. One boy described the process of assessing this way:

T09 (16y/Male): it's just like the micromanaging how you're feeling ... these symptoms, will it get worse, will it get better, and over how much time? Will it be an inconvenience? It's a lot of like planning....

Assessment of context included where and why symptoms were happening to determine expectedness, what activities were affected, and who was present at the time. While all teens evaluated similar contextual factors (e.g. who, what, when, where, why; Table 2). estimates

of the significance of these differed individually. For example, some teens minded taking an inhaler in class, whereas others did not. Similarly, some were fine stopping during sports or gym, while others indicated they would keep going despite symptoms. As one girl stated:

T04 (16y/Female): I assess how I'm feeling [and] I assess what's going on around me and if I can miss that to go do my inhaler.

Finally, teens considered the outcomes of previous choices, including personal consequences (e.g. embarrassment, missing out), how well medication worked, and natural progression of symptoms. As one teen stated:

T01 (14y/Female): I don't use [my inhaler] that much because ... when I use it, I don't feel like it's like working all the way.

Decide: Teens' summative assessments formed the basis for their subsequent cognitive decisions and behavioral responses, as shown in Tables 3 and 4. Decisions were made by weighing the importance of various factors, and responses with the most perceived benefit were selected.

T05 (15y/Male): I would first start out with assessing how bad it is.... relate it to whatever type of reasonable cure there is for it, or other temporary fix. And, then I would decide whether I should inhale a lot of air to try to expand my lungs, give a quick cough, or take the inhaler....[whichever will] really benefit you.

Respond: This process contained three basic tasks: managing active issues, communicating about asthma, and preventing future issues. For all teens, management included both behavioral (i.e. slowing down, waiting it out, holding breath) and pharmacologic strategies (taking asthma medication, using complementary/alternative medication). A few teens (4/14), who followed with pediatric pulmonologists, had asthma action plans, but indicated they did not actually use these. When possible, teens preferred non-pharmacologic strategies to medication, and discussed varied and creative means for symptom management, such as drinking fluids or taking a shower:

T15 (15y/Male): When I get the chest pain, I breathe in some cold air...I drink some water, or I'll use a cold washcloth on my throat, or my forehead. And then I'll wait ... then I'll slow down my breathing, ...then I'll take a shower and sit in the steam...and I'll relax, then I'll take my inhaler ... then when I get bad chest pains I'll take my nebulizer.

T05 (15y/Male): I think that if you're able to work out everything without taking any medication that is a positive thing....it builds tolerance.

2. Intrapersonal factors

Intrapersonal and cognitive factors: Personal values and priorities, beliefs, feelings, perceptions, and knowledge were discussed by all teens and parents in regards to self-management choices, and formed the basis for teens' assessment of and subsequent responses to asthma situations (Table 3). For example, one teen with uncontrolled asthma refused to start ICS therapy because she believed that steroids were "serious," knew they

were used by “really sick” people, and made her feel like her asthma was out of control. A diagram of her explanation (Figure 3) shows how assessments were contingent upon a mixture of knowledge, feelings, perceptions, and beliefs, and that “wants” were a key determinant of her final response.

The words “I want” and “I don’t feel like” occurred repeatedly as reasons for choices and clearly pointed to personal values and priorities that teens used to determine the best response to a given situation. Participants strongly indicated that their assessment of symptoms and subsequent responses were determined by what was important to them at the moment as well as long term. For example:

T02 (16y/Female): I take my [controller] medication every day because I do not want my asthma to get in my way or slow me down... I took it so that I don’t have to use my Albuterol when I’m running or being active.... I don’t want it to stop me from what I’m doing.

Most teens (11/14; 79%) and parents (9/14; 64%) talked about “maturing” and getting older as influencing self-management. Parents of older teens were less attuned to their teens’ asthma, and both parties expected greater independence in self-management that did not correspond with clinically effective asthma management or control.

3. Interpersonal factors—All teens and parents indicated that family, social, and physical environments affected asthma self-management (Table 4). Commonly cited physical environment factors included exposure to triggers (e.g. dusty houses, chemicals, allergens) and physical distance to medication at time of symptom onset. Teens specifically stated that the less accessible their inhaler was, the less likely they were to use it:

T04 (17y/Female): if I’m on the other side of school ...or I’m down on the couch watching a movie and I have to go all the way upstairs to do my inhaler, that definitely pushes it off because (*sighs*) ...I don’t want to climb the stairs.... It’s inconvenient.

Discussion of social environments centered around school (interactions with teachers, peers, and school nurses) and after school sports, but also included neighbors and extended family. In general teens indicated they felt most comfortable managing their asthma around people they knew intimately (e.g. peers and family) than around people they did not know as well.

Parental involvement, at varying levels, was referenced by all participants as related to self-management, and was noted to be greatest when teens were younger. Support from parents to establish a daily routine (19/28; 68%), help keep track of symptoms (16/28; 57%), and refill medications (14/28; 50%) were most commonly discussed. Teens with better asthma control appeared to have more parental oversight. For example:

P10: My role is, I keep all her medications in my room with me so I can make sure they’re getting taken daily, to monitor it because when I let her be independent about a year and a half ago, she was forgetting.

T10 (14y/Female): I can keep my track myself but sometimes I forget ... so my mom helps me... my mom’s very observant. (*borderline well-controlled*)

Conversely, teens with worse control and their parents more often reported greater independent responsibility to manage asthma:

P09: I rely on him to monitor his own symptoms, I'm not checking up on him.

T09 (16y/Male): I manage my asthma. I feel like I manage it fine. I don't need any assistance really. (*very poorly controlled*)

4. Outcomes—Clinically relevant outcomes (disease specific, psychosocial), such as improved symptoms, feeling better, or not having to go to the doctor/hospital were present in all narratives, but were not as heavily discussed as other more personal, and often non-clinical outcomes (e.g. medication side-effects, inconvenience, missing out, feeling embarrassed, feeling out of control or addicted to inhalers). For example, one teen (T13 in Table 1) avoided using her rescue inhaler well past the point of severe symptoms in order to avoid the *outcome* of shaking (a side-effect of albuterol) and being stared at. To her, avoiding the discomfort and embarrassment of shaking was more important than the asthma symptoms. In Table 2 (Assess; Outcomes), it is clear that teens regularly assessed the personal benefits and outcomes of their self-management choices, and based subsequent self-management decisions on this assessment. As one boy eloquently stated:

T08 (17y/Male): It's hard ... there's having an everyday life and having asthma in my life—it is my everyday life being well controlled...I need to not mess with my everyday life.

Revised definition and model

Figure 4 displays the revised conceptual model of asthma self-management, delineating the key constructs of self-management processes (assess—decide—respond), tasks (monitoring, managing, communicating, preventing), intrapersonal factors, interpersonal factors, and outcomes. From this, we derived the following operational definition:

Self-management is the iterative process of assessing, deciding and responding to specific situations in order to achieve personally important outcomes. Clinically relevant asthma self-management tasks include monitoring asthma signs and symptoms, managing active issues through pharmacologic and non-pharmacologic strategies, preventing future issues, and communicating with others as needed. Self-management processes are reciprocally influenced by intrapersonal factors (both cognitive and physical), interpersonal factors (family, social and physical environments), and personally relevant asthma and non-asthma outcomes.

Discussion

This study offers the first empirically derived definition and conceptual model of asthma self-management for adolescents, based on synthesis of teen and parent perspectives with the prior model derived from clinical and research data. As with our original model, the basic framework aligns closely with Social Cognitive Theory (SCT) and concepts of reciprocal determinism, while further extending upon the SCT structure by operationalizing factors specific to chronic disease in general, and asthma management specifically [19].

In comparing our past [18] and present model, we identified several key differences. The first difference between the present and prior model was in our conceptualization of “outcomes,” and the emphasis placed on personal priorities and values as a major intrapersonal factor. In typical scientific usage, “outcomes” is generally considered to represent health or psychosocial outcomes (e.g. symptom frequency, quality of life) relevant to society as a whole, and does not typically include outcomes that may only be relevant to the individual (e.g. inconvenience, interrupting activities) [32–36]. Yet our data clearly suggest that personal outcomes often drive self-management decisions. Thus, it may be time to broaden scientific definitions of outcomes to include individual-defined (i.e. nonclinical) outcomes. This could foster shared understanding of problems and solutions and promote patient-centered communication [37].

As clinicians and researchers, this will mean being sensitive to potential misalignments between our own and patients’ priorities, and avoiding unintentionally devaluing outcomes we view as less important. Such *clinically unimportant outcomes* may be key determinants of self-management choices. This was seen in the case of the teen who deferred taking her inhaler to avoid the outcome of shaking. Clinically, shaking is a minor side-effect and a largely peripheral issue. Yet for this teen and others, this was a *centrally important* outcome. Rather than marginalizing such perspectives, capitalizing on teens’ personal values and priorities—such as avoiding shaking—could be a strategic approach to counseling and education [38–40]. For example, teens who avoid using rescue medication due to shaking could be encouraged to use controller medication more consistently with the understanding that it can *prevent shaking* (the desired outcome) by decreasing symptoms and reducing need for rescue medication.

Motivational interviewing (MI) strategies might be particularly useful in this respect. It has been established that people are more likely to change when they can see a clear discrepancy between what they *want* and what they are *doing* [41]. MI is a technique that can help to promote awareness of behaviors that are incompatible with desired outcomes [38]. This involves helping people to recognize health-related needs and find personally meaningful reasons to change, as well as strengthening perceived ability and desire to do so. As illustrated in Figure 3, teens may in fact be aware of *need* to change, but lack compelling reasons or the desire to do so. In addition, medically recommended treatment may directly conflict with individual’s beliefs and perceptions about asthma and medications. Given that people are less likely to be adherent to prescribed treatments that do not align with health beliefs [42], it may be necessary to systematically explore patients’ thinking about asthma and asthma management as a routine part of care, so as to synchronize healthcare approaches and goals with personally relevant approaches and goals.

The second major change between the past and present model was differentiation of self-management into *processes* and *tasks*. Prior definitions and theories of self-management have typically considered tasks (e.g. communicating, developing skills) and factors affecting self-management to be synonymous with the entity itself [6, 7, 9, 43, 44]. From our analysis, we would argue that this is not the case, and that self-management is actually a process (assessing, deciding and responding), *containing* diverse tasks for managing personal,

psychosocial, and disease outcomes. In short, the process of self-management *happens*—whereas contextually dependent tasks may or may not.

Why is this distinction important? The processes of self-management appear relatively consistent. Conversely, because the *tasks* of self-management are performed so as to achieve specific goals, they are highly variable. The risk of confusing tasks with processes is that when individuals fail to perform designated tasks, or achieve designated outcomes, we are tempted to label them as “failing” to self-manage, or having “poor” self-management. This is not necessarily accurate. Contrary to clinical expectations, individuals may be employing different self-management behaviors to achieve *personally relevant* outcomes. It is therefore useful to separate the over-arching *concept* of self-management from the *process*, and furthermore, from the specific *tasks*, which might differ situationally.

In the present model, the original clinician and researcher-identified domains of self-management behaviors were redefined as tasks and relocated underneath the processes of self-management [18]. “Monitoring” (i.e. self-assessment, use of peak flow meters, and symptom diaries) was integrated as part of “assessing” while the other three domains (prevention, acute symptom management, and communication) were integrated as types of responses. These changes in no way minimize the importance of these key self-management tasks, but help to place them within a broader conceptual framework that is also relevant to teens and parents. Thus, we can reasonably state that in order to effectively self-manage *per* clinical standards, individuals will need to engage in key self-management tasks to monitor, manage, prevent, and communicate about asthma. While recognizing the importance of these tasks, it is also imperative to remain aware that individuals’ personal goals and priorities may not fully match clinical agendas, and that shared goal setting and compromise might be necessary.

These findings have implications for clinical conversations and intervention research. Precise terminology is needed, particularly in the scientific literature, to clarify whether items of interest are intrapersonal/interpersonal factors, cognitive/behavioral processes of self-management, or mastery of specific tasks. Theoretical understanding of the conceptual structure of self-management can not only improve dialogue as to what we are doing, but can facilitate the selection of intervention strategies to support study aims and assist in identifying if interventions are sufficiently similar methodologically to warrant meta-analysis [45].

The key findings of an iterative **ASSESS—DECIDE—RESPOND** process of self-management uncovered in this study correspond well with prior research and theory, including Lorig’s tasks of self-management (e.g. problem-solving, decision making, and taking action) [43] and the cognitive and behavioral processes identified by previous theorists [6, 19, 44]. Yet while the Asthma Self-Management (ASMa) model has much in common with existing theory, such as the Individual and Family Self-management Theory (IFSMT) model, the conceptual layout is distinct [9]. For example, IFSMT identifies three dimensions (context, process, outcomes), where context is seen as risk and protective factors and self-management behaviors *are* outcomes. Furthermore IFSMT considers that self-management behaviors are “health promotion behaviors” used to manage chronic

conditions, and the processes of self-management are “facilitation of knowledge and beliefs, enhancement of self-regulation skills...and social facilitation” [9]. In contrast, the ASMa model represents self-management as an *iterative personal process*, incorporating a variety of cognitive and behavioral tasks (only some of which may be health promotion behaviors), which *occurs within* diverse life-contexts and is used as a *means to* specific outcomes. In real-world terms, and as stated by one teen, individuals engage in self-management behaviors so as to minimize the impact of asthma on their daily lives. Thus, while prior theoretical representations have demonstrated scientific utility from an evaluation standpoint, they do not adequately reflect the personal element or prioritize the viewpoint of the individual. It is essential to keep in mind that *individuals* are the “self” in self-management, and theoretical perspectives of self-management should clearly reflect this.

Limitations

There are limitations to this analysis. First, teen data were collected from a relatively narrow age range (13-17 years), and may not fully represent the viewpoints of older or younger individuals. Second, ethnic distribution for our sample was mostly Black and White. Given existing evidence of cultural differences in asthma management, there might be variations in operationalizing the finer details of components for diverse ethnic groups [46–50]. For example, teens in our sample prioritized fitting in, not missing out, and convenience. We deliberately excluded this type of fine detail in the model and definition and used more inclusive terms like “personal values and priorities” to better reflect individuality and avoid constraining the model through excess details.

Despite noted limitations, we believe our findings have face-validity and present a compelling case for the structure and key components of the ASMa model, all of which are well-supported by prior research in adult, pediatric, and diverse disease management literature [50–53]. Thus, we expect that the broad framework and process defined here will apply to other age groups and chronic conditions, with customization of individual components to age and disease process. As such, we believe that the ASMa model has the potential to contribute towards a maturing science and theory of self-management.

Conclusion

The ASMa model suggests that self-management processes and behaviors are reciprocally influenced by individually variable personal and interpersonal factors, and are driven by personally important outcomes. Clinicians should consider specifically asking teens about symptom perceptions, medication beliefs, current approaches to symptom management, goals, and personal priorities. This knowledge can provide a foundation for shared decision-making, and development of individualized self-management plans. Researchers would also benefit by adopting a common consensus definition of asthma self-management. Precise terminology is not only essential to clear communication and shared understanding, but can contribute towards a more cohesive theoretical understanding of asthma self-management.

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References

1. CDC. Summary health statistics, National Health Interview Survey, 2015. 2015. [cited 2017 Web Page]. Available from: https://ftp.cdc.gov/pub/Health_Statistics/NCHS/NHIS/SHS/2015_SHS_Table_C-1.pdf
2. Bruzzese JM, Fisher PH, Lemp N, Warner CM. Asthma and social anxiety in adolescents. *J Pediatr*. 2009; 155(3):398–403. [PubMed: 19555965]
3. Katon W, Lozano P, Russo J, McCauley E, Richardson L, Bush T. The Prevalence of DSM-IV Anxiety and Depressive Disorders in Youth with Asthma Compared with Controls. *J Adolesc Health*. 2007; 41(5):455–63. [PubMed: 17950165]
4. Rand CS, Wright RJ, Cabana MD, Foggs MB, Halterman JS, Olson L, et al. Mediators of asthma outcomes. *J Allergy Clin Immunol*. 2012; 129(3 Suppl):S136–41.
5. Norris, CM. Concept Clarification in Nursing. Rockville, Md: Aspen Systems Corp.; 1982.
6. Creer, T, Holroyd, K. Self-management. In: Baum, A, Newman, S, Weinman, J, West, R, McManus, C, editors *Cambridge Handbook of Psychology & Health and Medicine*. Cambridge: Cambridge University Press; 1997.
7. The 1st Annual Crossing the Quality Chasm Summit: A Focus on Communities. Institute of Medicine (US) Committee on the Crossing the Quality Chasm: Next Steps Toward a New Health Care System. Washington (DC): National Academies Press; 2004.
8. Corbin J, Strauss A. Managing chronic illness at home: three lines of work. *Qual Sociol*. 1985; 8(3): 224–47.
9. Ryan P, Sawin KJ. The Individual and Family Self-Management Theory: background and perspectives on context, process, and outcomes. *Nurs Outlook*. 2009; 57(4):217–25 e6. [PubMed: 19631064]
10. Grady PA, Gough LL. Self-management: a comprehensive approach to management of chronic conditions. *Am J Public Health*. 2014; 104(8):e25–31. [PubMed: 24922170]
11. Al-Sheyab N. Power of peer leaders in improving self-management skills among adolescents with asthma. *Evid Based Nurs*. 2012; 15(2):45–6. [PubMed: 22187501]
12. Gibson-Scipio W, Gourdin D, Krouse HJ. Asthma Self-Management Goals, Beliefs and Behaviors of Urban African American Adolescents Prior to Transitioning to Adult Health Care. *J Pediatr Nurs*. 2015; 30(6):e53–61. [PubMed: 26169338]
13. Sin M-K, Kang D-H, Weaver M. Relationships of asthma knowledge, self-management, and social support in African American adolescents with asthma. *Int J Nurs Studies*. 2005; 42(3):307–13.
14. Rhee H, Belyea MJ, Ciuzyński S, Brasch J. Barriers to asthma self-management in adolescents: relationships to psychosocial factors. *Pediatr Pulmonol*. 2009; 44(2):183–91. [PubMed: 19142893]
15. Rhee H, Belyea MJ, Halterman JS. Adolescents' perception of asthma symptoms and health care utilization. *J Pediatr Health Care*. 2011; 25(2):105–13. [PubMed: 21320682]
16. Rhee H, Fairbanks E, Butz A. Symptoms, feelings, activities and medication use in adolescents with uncontrolled asthma: lessons learned from asthma diaries. *J Pediatr Nurs*. 2013; 29(1):39–46. [PubMed: 23685266]
17. Walker, L, Avant, K. *Strategies for Theory Construction in Nursing*. 5th. New York: Prentice Hall; 2011.
18. Mammen J, Rhee H. Adolescent asthma self-management: a concept analysis and operational definition. *Pediatr Allergy Immunol Pulmonol*. 2012; 25(4):180–9. [PubMed: 23285426]
19. Bandura, A. *Social Foundations of Thought and Action: A Social Cognitive Theory*. Englewood Cliffs, NJ: Prentice Hall; 1986.

20. Mammen J, Norton S, Rhee H, Butz A. New approaches to qualitative interviewing: Development of a card sort technique to understand subjective patterns of symptoms and responses. *Int J Nurs Stud*. 2016; 58:90–6. [PubMed: 26897540]
21. Mammen JR, Rhee H, Norton SA, Butz AM. Perceptions and experiences underlying self-management and reporting of symptoms in teens with asthma. *J Asthma*. 2017; 54(2):143–52. [PubMed: 27337035]
22. Marshall, C, Rossman, G. *Designing Qualitative Research*. 5. London: SAGE; 2011.
23. Maxwell, JA. *Qualitative Research Design: an Interactive Approach*. Thousand Oaks, CA: Sage; 2012.
24. National Heart Lung and Blood Institutes [NHLBI]. *Asthma care quick reference*. Bethesda, Md.: National Asthma Education and Prevention Program; 2011.
25. Atlas.ti 7. Berlin: Scientific Software Development GmbH; 2013.
26. XMind. n.d.[February 7, 2016]. Available from: <http://www.xmind.net>
27. Saldaña, J. *The Coding Manual for Qualitative Researchers*. 2nd. Washington, DC: Sage; 2013.
28. Hsieh HF, Shannon SE. Three approaches to qualitative content analysis. *Qual Health Res*. 2005; 15(9):1277–88. [PubMed: 16204405]
29. Ayres L, Kavanaugh K, Knafl KA. Within-case and across-case approaches to qualitative data analysis. *Qual Health Res*. 2003; 13(6):871–83. [PubMed: 12891720]
30. Mammen JR. Computer-Assisted Concept Mapping: Visual Aids for Knowledge Construction. *J Nurs Educ*. 2016; 55(7):403–6. [PubMed: 27351610]
31. US Department of Housing and Urban Development [US DoHUD]. *Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970 (Uniform Act or URA) - FY 2011 Low Income Limits 2011*. Available from: <http://www.huduser.org/portal/datasets/ura/ura11/RelocAct.html>
32. Akinbami LJ, Sullivan SD, Campbell JD, Grundmeier RW, Hartert TV, Lee TA, et al. Asthma outcomes: healthcare utilization and costs. *J Allergy Clin Immunol*. 2012; 129(3 Suppl):S49–64. [PubMed: 22386509]
33. Cloutier MM, Schatz M, Castro M, Clark N, Kelly HW, Mangione-Smith R, et al. Asthma outcomes: composite scores of asthma control. *J Allergy Clin Immunol*. 2012; 129(3 Suppl):S24–33. [PubMed: 22386507]
34. Fuhlbrigge A, Peden D, Apter AJ, Boushey HA, Camargo CA Jr, Gern J, et al. Asthma outcomes: exacerbations. *J Allergy Clin Immunol*. 2012; 129(3 Suppl):S34–48. [PubMed: 22386508]
35. Krishnan JA, Lemanske RF Jr, Canino GJ, Elward KS, Kattan M, Matsui EC, et al. Asthma outcomes: symptoms. *J Allergy Clin Immunol*. 2012; 129(3 Suppl):S124–35. [PubMed: 22386505]
36. Wilson SR, Rand CS, Cabana MD, Foggs MB, Halterman JS, Olson L, et al. Asthma outcomes: quality of life. *J Allergy Clin Immunol*. 2012; 129(3 Suppl):S88–123. [PubMed: 22386511]
37. King A, Hoppe RB. “Best practice” for patient-centered communication: a narrative review. *J Grad Med Educ*. 2013; 5(3):385–93. [PubMed: 24404300]
38. Rollnick S, Miller WR. What is motivational interviewing? *Behav Cognitive Psychotherapy*. 1995; 23:325–34.
39. Norcross JC, Krebs PM, Prochaska JO. Stages of change. *J Clin Psych*. 2011; 67(2):143–54.
40. Smith S, Mitchell C, Bowler S. Patient-centered education: applying learner-centered concepts to asthma education. *J Asthma*. 2007; 44(10):799–804. [PubMed: 18097853]
41. *Enhancing Motivation for Change in Substance Abuse Treatment*. Rockville (MD): Center for Substance Abuse Treatment; 1999. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/22514841>
42. Horne R, Chapman SC, Parham R, Freemantle N, Forbes A, Cooper V. Understanding patients’ adherence-related beliefs about medicines prescribed for long-term conditions: a meta-analytic review of the Necessity-Concerns Framework. *Understanding patients’ adherence-related beliefs about medicines prescribed for long-term conditions: a meta-analytic review of the Necessity-Concerns Framework*. 2013; 8(12):e80633.

43. Lorig KR, Holman H. Self-management education: history, definition, outcomes, and mechanisms. *Ann Behav Med.* 2003; 26(1):1–7. [PubMed: 12867348]
44. Diefenbach M, Leventhal H. The common-sense model of illness representation: Theoretical and practical considerations. *J Social Distress Homeless.* 1996; 5(1):11–38.
45. Rimer, BK, Glanz, K. *Theory at a glance: A guide for health promotion practice.* Bethesda, MD: US DHHS, National Cancer Institute; 2005.
46. Berg J, Morpew T, Tran J, Kilgore D, Galant SP. Prevalence of complementary and alternative medicine usage in Vietnamese American asthmatic children. *Clinical Pediatrics.* 2015
47. Bailey EJ, Cates CJ, Kruske SG, Morris PS, Chang AB, Brown N. Culture-specific programs for children and adults from minority groups who have asthma. *Cochrane Database Syst Rev.* 2009; (1):CD006580.
48. Fritz GK, McQuaid EL, Kopel SJ, Seifer R, Klein RB, Mitchell DK, et al. Ethnic differences in perception of lung function: a factor in pediatric asthma disparities? *Am J Respir Crit Care Med.* 2010; 182(1):12–8. [PubMed: 20299534]
49. Forno E, Celedon JC. Asthma and ethnic minorities: socioeconomic status and beyond. *Curr Opinion Aller Clin Immunol.* 2009; 9(2):154–60.
50. Oakes AH, Garmo VS, Bone LR, Longo DR, Segal JB, Bridges JFP. *Identifying and Prioritizing the Barriers and Facilitators to the Self-Management of Type 2 Diabetes Mellitus: A Community-Centered Approach.* Patient. 2017
51. Holley S, Morris R, Knibb R, Latter S, Liossi C, Mitchell F, et al. Barriers and facilitators to asthma self-management in adolescents: A systematic review of qualitative and quantitative studies. *Pediatr Pulmonol.* 2017; 52(4):430–42. [PubMed: 27717193]
52. Pickles K, Eassey D, Reddel HK, Locock L, Kirkpatrick S, Smith L. “This illness diminishes me. What it does is like theft”: A qualitative meta-synthesis of people’s experiences of living with asthma. “This illness diminishes me. What it does is like theft”: A qualitative meta-synthesis of people’s experiences of living with asthma. 2017
53. Jung MJ, Jeong Y. Motivation and Self-Management Behavior of the Individuals With Chronic Low Back Pain. *Orthop Nurs.* 2016; 35(5):330–7. [PubMed: 26918776]

FIGURE 1.

Coding schema derived from original model of adolescent asthma self-management

FIGURE 2.

Coding schema for the concept "asthma self-management" based on synthesis of teen and parent data with prior concept analysis

FIGURE 4.
Revised model of self-management, with delineation of subcomponents specific to asthma and adolescents

TABLE 1

Sample quotes from concurrent teen voice-diaries demonstrating a cyclical “ASSESS—DECIDE—RESPOND” process of self-management

- T01: **I was having an asthma attack because I was running up and down the street with my friends.** *So what I did was I went into the kitchen and I drunk some water, and then after it eased down, then I had sat outside on the porch to get some fresh air.*
- T02: **When I woke up, it was hard for me to breathe, I was not wheezing, but it was hard for me to catch my breath.** *I felt as though it probably occurred because I was sleeping under a fan, and it usually triggers my asthma. Because I was at a friend's house I decided to take my asthma pump because I couldn't take my Advair because I needed something that could act fast, right then and there. So I took my asthma pump. I took two pumps and I sat there for a while so my asthma could calm down.*
- T04: **I knew that we'd be cleaning** *so I went to do my inhaler because I knew that we'd be moving around the dust and the dog hair and stuff that would trigger my asthma. I went to do my inhaler but I could not find it. ... so I looked around a little bit for it but then I just kind of gave up then I was like, I really should take my inhaler. So I went and I went searching for my inhaler and asked my mom if she saw it and then we found it on the counter and um, then I did my inhaler and um, I was good.*
- T05: *I actually just had to use my inhaler because when I got into bed I was actually somewhat short of breath and my lungs felt kind of tight and it was a little bit hard to breathe and to try to relax to me, I used the inhaler*
- T06: *I decided to take my inhaler because I was getting out of breath. I didn't wheeze before I took it, I was just short breaths.*
- T07: *Going [upstairs] my chest [was] getting tight... I'm handling it by just taking a break and stopping at the end of the stairs. Um, I decided to just walk slower*
- T08: **I wasn't getting winded but I was like, um getting all hot and stuff.** *It wasn't my asthma symptoms, I just knew I gotta take my puffer—So I'm about to take my puffer*
- T09: **I've been coughing periodically throughout the day, it hasn't been like severe but I'll be like talking to someone and then I'll have to take a break from like even mid-sentence and ... I can hear wheezing.** *Um the symptoms aren't too bad -it wasn't exercise induced Um I can't think of any causes I haven't taken any steps to um like treat/alleviate my um symptoms. But it's definitely something I will take notice of and I'll use it to base what steps I'll take tomorrow. I took Singulair again tonight.*
- T10: **we're doing this fitness unit and I'm getting tired really quick and- and it's hard- getting harder for me to breathe.** *I'm getting like a tightness in my chest but I don't go to the nurse for it cause I was like that's normal you know, that's normal for me so I was ok with it.*
- T11: **I still have a cold** *so I decided to try different medicine... it didn't work as well. The symptoms were worse, on a higher level. So, I took Mucinex ...since then, it feels much better. I realized that there was a difference in the symptoms so I tried something new, it didn't work as well so I went back to the old ways.*
- T12: **Today I had a soccer game. I felt a little tight...I didn't get to the point where I was wheezing or collapsing ... I was exercising and running around...I think that's what caused the symptoms ... I handled it by just stepping back, taking a break and going off the field for a few minutes ... I just thought about how I was feeling and how I felt before and decided when I should go off the field or um, relax on the field.**
- T13: **My chest was really tight and I was coughing ... I wasn't feeling well [but] I felt like people were staring at me So, I decided my asthma wasn't bothering me that much, so I didn't take my inhaler because I felt like people would stare.** *But since I took it ahead of time it started kicking in, and when I was lifting my hand to write I would start shaking and I didn't really like that, so I tried to hide it and keep my hand on the desk or keep my hands like occupied by I-like-playing-fidgeting my fingers so they wouldn't see me.*
- T14: **if I wait it out and it doesn't get any better and if it keeps getting worse, then I should take something before it gets too bad...** *But when I get at least little breathes in then I think I could go without using it...I choose [to wait] first because if it's not like horrible then I don't really think I would need to use an inhaler.*
- T15: **we started playing basketball and my asthma was bothering me but I didn't bring my inhaler** *so I went out in the hallway and drank some cold ice water and then I uh, played basketball again ((chuckle)) and it got bad again, so I had some water. And I stopped.*

Key: **Bold text = Assessing**; *Italicized grey text = Deciding*; Underlined text = Responding

TABLE 2

Substantiating data for self-management processes and tasks in revised model

PROCESS: ASSESS	
Task: Assess/Monitor Signs & Symptoms	T04: When I go to college, I'll write down more things because I won't have my mom to help, but it's a pain...so I just keep a mental log to assess it T05: I'm a self-assessment person... I'll like, interview myself ... assess how I feel and why I feel that way and what things can solve that feeling.... I kind of graded it depending on how, how bad it felt. T06: I've been doing good. I'm not wheezing— just coughing ... So that's a good thing, before I was wheezing. T07: I would just keep tabs and I would just react then. T09: they gave us like the little, um, I'm not sure—one of those where like, it was...it had ...it's like a scale.... then um, you blow in, and then depending on how far you push your little like pin... [it shows] what should be normal levels... we haven't used those in a while. T11: I don't like make a journal or anything.
Assess Context	T01: It's OK in front of family, but I feel like in school, you wouldn't do it in class. You'd probably go to the bathroom and do it. T05: I would take it in class because I have this paper that lets me do that...if we're in gym class, you have to suck it up and try and get through T06: Now that I'm in a new school I was embarrassed to take my inhaler - at my old school I didn't care 'cause everybody knew that I had asthma. T11: I guess if it was like a an important moment like if it was a meet or a race or something like that I'd definitely push through [the symptoms], but if it was something not as important like a practice with friends ...I'd probably slow down T12: it depends on the situation... if [the ball] is around me I wouldn't be able to [stop] because then that would leave my team open. P12: He feels [he can't stop] he needs to not let the team down, he needs to play his part... T13: if, I was in gym ... I would try and hide it. I would wait and kind of just slow down. T14: I wouldn't use it [the inhaler] in front of my friend cause she was like saying that my breathing was fine.
Assess Outcomes	T01: I took it [the inhaler] and it didn't work T05: I actually did feel a little bit under the weather with my asthma, but I had a cup of tea and I do feel a lot better ... hot tea helps. T09: it's gotten to the point where I notice that even with the inhaler it's like the symptoms are still pretty severe. P10: She was using her uh nebulizer...every four hours and her symptoms were not controlled T10: We kind of knew, okay, the inhaler isn't helping, ...it helped for about two hours and then after that I took another Nebulizer which helped a lot T12: I took my albuterol before playing and that seemed to help for the first half but then I just got worse. T13: I took the Flovent again today, but it didn't really help as much as the prednisone.
PROCESS: DECIDE	
Determine response = most benefit + least burden	T02: I knew it was gonna get worse. So that's why I decided to take my Albuterol. T06: I decided to take my inhaler before [sports], like I'm supposed to, so I don't have an asthma attack. T11: I realized there was a difference in the symptoms so ... I decided to go back to the old rather than keep going with the new that didn't work. T13: I decided my asthma wasn't bothering me that much so I didn't take my inhaler because I felt like people would stare.
PROCESS: RESPOND	
Manage active issues	T01: I try to hold my breath and see if it'll calm down or something. I try to breathe out my nose so I won't hear [the wheezing]
Pharmacologic	T04: I think I would wait a couple hours ...I've just learned to ignore [it] because I don't want it to stop me from what I'm doing. T05: Try not to be in a dusty room. Besides that, breathing exercises, self-assessment, and taking the pump normally works well. T07: I would sit down, rest for a minute, then drink water and wait, if that's not helping I take my inhaler.
Behavioral	T09: I know some people react to like the same symptoms more --like they're more cautious of it-- where me I'm a lot more lenient with discomfort or physical pain. If I can just I can make it through the day, I'll be fine. It's not that big of a deal. if it becomes like unusually uncomfortable or something like that then maybe I'll take measures but usually I can tolerate.
Asthma medication	
Alternative medication	
Tolerate symptoms	
Modify activity	
Breathing techniques	

PROCESS: ASSESS		
	• Urgent healthcare	P10: We have an asthma action plan in place... I'm a very pro-active mom. (T10: Action plan? Um, what do you mean?...I think it's better to know what you need to do yourself than what a piece of paper can tell you.)
	• Action plan	P11: You pull out your plan and it's like maybe you need to bump up the Albuterol... (T11: ...Yeah [but] we haven't really ever pulled it out.)
<i>Communicate/Interact</i>		
	• Peers	T01: I tell [my mom] that I need a refill. Or she'll ask. T02: Usually I do not talk to people about my asthma symptoms. The only time I talk is if I have to use my Albuterol pump, which I rarely do.
	• Healthcare providers	T04: I tell my mom everything, my mom and I tag team it, cause like what I don't remember she'll remember, she doesn't remember, I'll remember
	• Other authority figures	P04: She tells me when her asthma medication needs to be refilled.
	• Caregivers	T05: My dad I definitely feel comfortable talking to. Because he has asthma and he had it for years and he was the one that taught me the whole self-breathing thing... I would gladly tell a coach... because if I can't breathe or can't do this the coach should know about it. T06: I couldn't breathe...I was like hitting my chest, then I shook my hand in the air for my coach to come, to get me out cause he didn't see me.
		P08: He says to me, 'You're right I was wheezing, I just took my inhaler. I feel a little better, but you know remind me in a couple hours how I feel.' P11: He'll say, 'Mom I'm wheezing ... That's something we established early on [because] I'm the one that remembers when we go see doctor.
<i>Prevent</i>		
	• Avoid triggers	T02: I do not want my asthma to get in my way. So I take my medicine to prevent any asthma symptoms T06: I avoid running hard [to prevent symptoms]
	• Adhere to treatment	T07: I don't play outside when it's too cold. P09: He has like a hypoallergenic pillow, with pillow-the dust mite cover. We haven't removed the carpeting in his bedroom, we probably should.
	• Follow up	P10: I keep a very clean environment...no smoking, no pets. All those things can be triggers T11: I felt the tightness coming on so I had to stop [shoveling snow] and it was just kind of me preventing what could have happened. I could feel it happening, so I stopped, I did not end up taking [my inhaler] It just kind of was able to go away on its own.
		T13: I'll try and stay away from smokers. I'll try an walk away from like a candle store - I'll just wait for her outside because I know it'll bother me. T15: felt like I was breathing through a straw and I drank cold water and put a cold washcloth over my face, and that didn't work and then I had to take the neb because it just was not getting any better and then I just, and then it kind of like helped me but I started feeling shaky, and I don't really like that, so then I took a warm shower and I just took my Advair.

TABLE 3

Substantiating data for intrapersonal factors in revised model

INTRAPERSONAL FACTORS	
<i>Knowledge</i>	<p>T08: I know [the inhaler] works, but I would like to know it works... Because you don't want to take random stuff. ...[I] need to know what is this medicine gonna do for me in the long run. [then] I'm gonna wanna take it.</p> <p>T06: I didn't have my spacer today, so I was thinking, "is this gonna work, without the spacer?"</p> <p>T04: I don't know if inhalers, can they stop working? Can you like build up an immunity to them?</p>
<i>Beliefs</i>	<p>T15: Controlled asthma is like where it's not going out of hand, where I can actually breathe and it's not like I'm not having breathing issues like non-stop.</p> <p>T06: I feel like the asthma is like serious and I need to take care of it more.</p> <p>T06: I was having a hard time breathing so I went to go take my inhaler and it – I believe it worked cause I just went right back to bed after I took it</p>
<i>Perceptions</i>	<p>T02: Most of the time I do not talk about my asthma because ... I just don't wanna feel like I need extra help I wanna feel normal.</p> <p>T10: it's not that serious - you'll get used to it as you get older, you'll get used to it. It's nothing, you'll be like it's nothing.</p> <p>T11: Wheezing...it's like ... other people can hear—It makes me want to get the inhaler</p> <p>T04: if it was something that was like really <i>really</i> affecting me ... I'd push it up on the importance list and be like mom we really need to go [to the doctor].</p> <p>T08: I think ten minutes is slow. It has to be fast like right there – on my first puff I feel the relief</p>
<i>Attitudes/Feelings</i>	<p>T08: I had to be able to accept [my asthma], it's gonna be with me for a long time, so let's do something about it.</p> <p>T13: it kind of feels kind of embarrassing ... it feels a lot different than other kids. Like after gym they won't be tired, and heavy breathing like me because of my asthma ... I kind of try and hide it so they don't see, because I don't really wanna be the one who seems like I'm different than all of them</p>
<i>Personal values & priorities</i>	<p>T08: You can't push off a symptom.... you gotta take your medicine <i>first</i> then you can go watch movie...eat popcorn.... This is Advair, the purple inhaler I use morning and night, even on weekends, I never stop using my asthma inhaler, it doesn't matter what day it is. Asthma can get you any day of any season; winter, summer, fall, autumn...any of them. Don't be too busy to take care of yourself, take care of your body, your health...it's very important.</p> <p>T06: I wanted to do what everybody else was doing</p>
<i>Age-specific cognitive characteristics</i>	<p>P15: He says, 'I'm alright,' because kids think about that moment, that hour. You were coughing your brains out, you're not ok! [They] forget after a day.</p> <p>P05: If he were younger it be different because we'd be monitoring each puff, but he's goes off in room and he's independent</p> <p>P14: I think it depends on their maturity. I think for some teens it would be fine, you know controlling the medications and keeping track of their symptoms. Um, for [T], I think that she just doesn't have that maturity quite yet. So for her I don't think that it's really something that she can do all that well.</p> <p>T04: when I was younger I would be like, when we had a schedule like I need to take your inhaler 2 puffs twice a day and like my mom regulated that, as I got older I was able to recognize my symptoms and be like oh I need to do my inhaler</p>

TABLE 4

Substantiating data for interpersonal factors in revised model

INTERPERSONAL FACTORS	
<i>Family</i>	<p>P08: he couldn't do it [manage his asthma] without me, I don't think, and I couldn't do it without him.</p> <p>T08: without family, or my mother at least, it would've been hard my mom reminds me, [she] has been a big help with my asthma.</p> <p>T04: my mom probably start asking me question like, do you feel tight, do you need to do your inhaler, and I would recognize if I needed it or not and I think that's how it kind of switched over, that's how I kind of started recognizing that I had the tightness and I need to do my inhaler</p> <p>P14: I pretty much monitor her medicine because if I leave it to her she doesn't always remember.</p>
<i>Social environment</i>	<p>T05: Everybody made fun of me on the team because I used to have to breathe like a pregnant lady.</p> <p>T06 (Diary day 4): And now that I'm in a new school I was a little embarrassed, starting up again to take my inhaler be-cause at my old school I didn't really care 'cause everybody knew that I had asthma. Well nobody at this school knows, so I was a bit embarrassed to take it and I didn't take it....(Diary day 10): When I took my inhaler I was okay—I did it in front of my friends, and they didn't say anything. I'm starting to get more comfortable with taking my inhaler in front of people.</p>
<i>Physical environment</i>	<p>T01: If I'm in a dusty place or somebody just got done sweeping or dogs come up to me and lick me, my face start like getting all puffy and my eyes swell up</p> <p>T04: I was walking around the neighborhood and some people had sprayed their lawns, which I'm allergic to those chemicals.</p> <p>T02: I took my Albuterol because I had it on me</p>