A stylized human figure in motion, rendered in shades of blue, pink, and green, set against a background of dark blue, pink, and green triangles separated by white lines. The figure is positioned in the upper half of the slide, appearing to be in a dynamic pose.

Meeting 4

# Promotion of Physical Activity

**Chair: Abby King**

Members: John Jakicic, David Marquez, Melicia Whitt-Glover

# Experts and Consultants



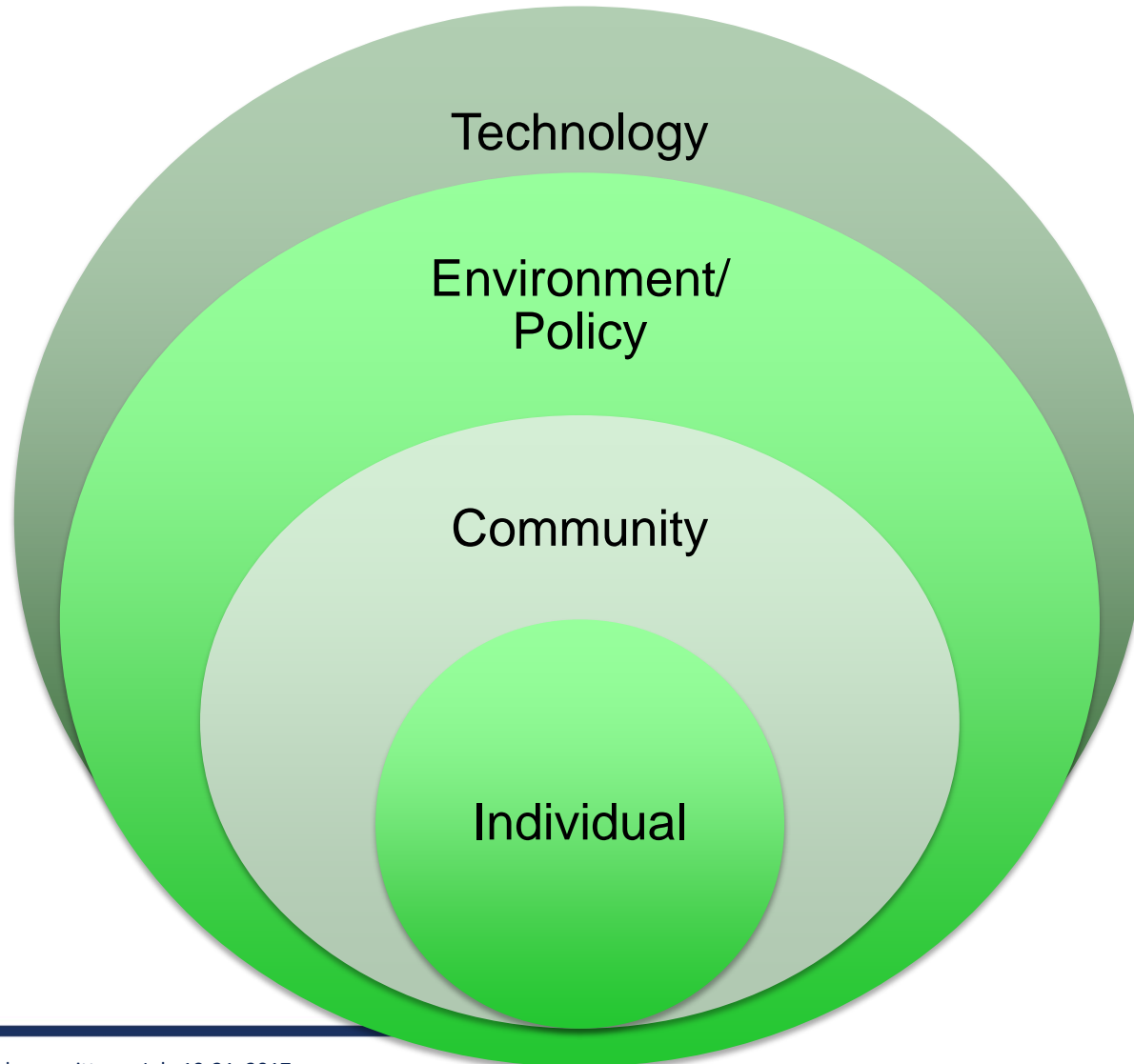
- **Consultants:**
  - Matthew P. Buman, Ph.D., FACSM
  - Arizona State University
  - Melissa A. Napolitano, Ph.D.
  - The George Washington University
- **ICF Staff: Bethany Tennant, Ph.D.**
- **Federal Liaison: Janet Fulton, Ph.D., FACSM**

# Subcommittee Questions



1. What interventions are effective for increasing physical activity at different levels of impact?
  - a) Does the effectiveness vary by age, sex, race/ethnicity, or socio-economic status?
2. What interventions are effective for reducing sedentary behavior?

# Social Ecological Framework



# Background Information

- One global search completed for entire PA intervention field to encompass all types of interventions (SRs, MAs, govt. reports).
- Given breadth of literature (not reviewed for 2008 Guidelines development), decision made to focus on those intervention areas, *based on the search*, with sufficient evidence to allow evidence grading.
- Ultimately limited the period for reviews to 2011 onward.
- Typically, in this field, grade of “Limited” reflects dearth of a reasonable number of SR/MAs and/or rigorously controlled trials with clear reporting of evidence (e.g., between-arm differences, magnitude of effects, appropriate PA behavior measurement, short intervention durations, i.e., <6 mos.).
  - But often some early promising studies.

# Question #1

- What interventions are effective for increasing physical activity at different levels of impact?
- Source of evidence to answer question:
  - Systematic reviews
  - Meta-analyses
  - Pooled analyses
  - Existing reports
- *Again, focus on identifying areas for which sufficient evidence exists to assign an evidence grade*

# Analytical Framework

## Systematic Review Question 1

What interventions are effective for increasing physical activity at different levels of impact?

### Target Population

People of all ages

### Intervention/Exposure

Physical activity intervention(s) at different levels of impact

- Information Technology
- Policy & Legislative
- Built/Neighborhood Environment
- Community Settings
- Individual

### Endpoint Health Outcome

Physical activity behavior change

### Key Definition

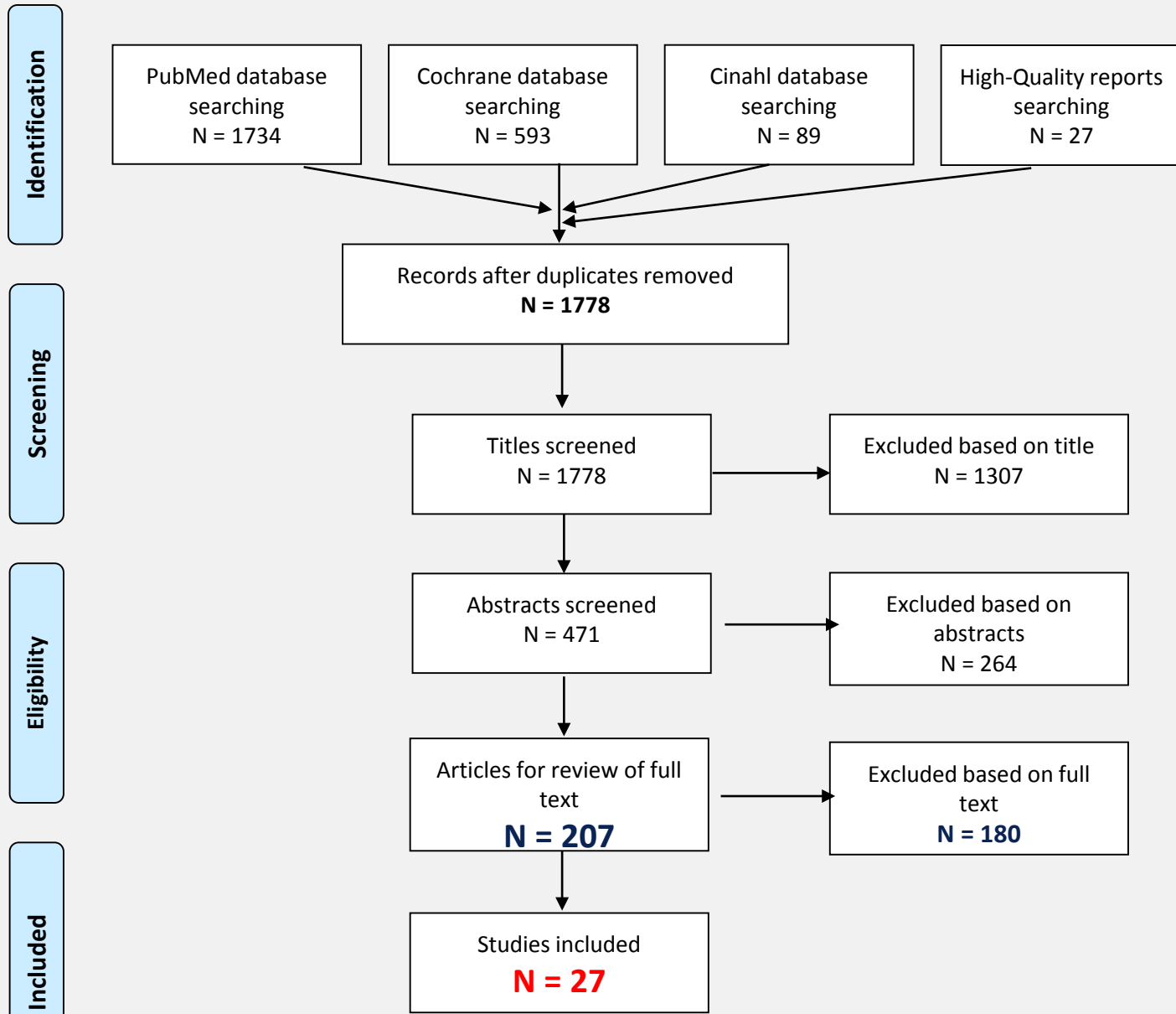
Intervention: any kind of planned activity or group of activities (including programs, policies, and laws) designed to prevent disease or injury or promote health in a group of people, about which a single summary conclusion can be drawn (*The Community Guide* <http://www.thecommunityguide.org/about/glossary.html>).

# Technology: Definition

- Information and communication technologies (ICT) = technologies which utilize computerized information or remote communication interfaces and/or which allow people and organizations to interact in the digital world
- The diverse types of ICTs available & their accessibility and reach across increasingly representative segments of the U.S. youth and adult population have made them an attractive platform upon which to deliver PA interventions.



# Search Results- Technology: Reviews<sup>1</sup> and Reports



<sup>1</sup> Reviews include systematic reviews, meta-analyses, and pooled analyses.

# Description of the Evidence: Technology

## 7 Sub-categories (that emerged from the search):

- **Activity Monitors:** 4 Systematic Reviews, 3 Meta-Analyses
- **Computer-tailored Print:** 2 Systematic Reviews
- **Interactive Video Games:** 3 Systematic Reviews
- **Mobile Phone:** 5 Systematic Reviews, 3 Meta-Analyses
- **Social Media:** 1 Systematic Review, 2 Meta-Analyses
- **Telephone-assisted:** 2 Systematic Reviews
- **Web-based or Internet delivered:** 3 Systematic Reviews, 1 Meta-Analysis

# Draft Conclusion Statements: Technology

- Activity Monitors
  - Strong evidence that wearable activity monitors can help increase PA in general adult population and in those who have type 2 diabetes. **PAGAC Grade: Strong for both groups**
  - Moderate evidence that they can help increase PA in adults with overweight or obesity. **PAGAC Grade: Moderate**
  - Limited evidence that they may help increase PA in adults with musculoskeletal disorders. **PAGAC Grade: Limited**

# Draft Key Findings – Examples of each evidence grade in *Activity Monitors* category

- In Patients with *Type 2 Diabetes*: STRONG evidence

- Meta-analysis of 7 studies (861 participants): Step-counter use increased PA by mean of 1,822 steps/day (95% CI = 751 to 2,894 steps/day).
- Step-counter use in combination with PA goal-setting more effective than use without PA goal-setting.
- E.g., WITH goal-setting: weighted mean difference of 3,200 steps/day (95% CI = 2,053 to 4,347 steps/day). WITHOUT goal-setting: WMD of 598 steps/day, (95% CI = -65 to 1,260 steps/day).
- Step-counter use in combination with step diary more effective than use without step diary (WITH diary: WMD= 2,816 steps/day; WITHOUT diary: WMD= 115 steps/day).

- In *Overweight or Obese Adults*: MODERATE evidence

- Meta-analysis: Behavioral PA interventions that included an activity monitor significantly increased *steps per day* (4 studies: SMD= 0.90) and *MVPA minutes* (3 studies: Standardized MD= 0.50, 95% CI 0.11 – 0.88) compared to *wait-list or usual care controls*.
- Less clear results for *MVPA* when *activity monitor was added to existing interventions relative to when it was Not* (3 studies: SMD for MVPA mins= 0.43, 95% CI 0.00 – 0.87).
- In similar meta-analysis of 2 studies including Women Only with outcome of *walking MET-minutes per week*, mean difference= 282; 95% CI 103.82 to 460.18,  $p < .002$ ).

## Draft Key Findings – Examples of each evidence grade in *Activity Monitors* category - continued

- In Patients with *Musculoskeletal Disorders*: LIMITED evidence
    - Systematic review of 7 RCTs of step-counter based walking programs: 5 studies reported significant within-arm increases in steps over baseline averaging 1950 steps/day.
    - *Magnitude of change varied markedly* across studies (range = 818 – 2,829 steps/day), and only 2 studies reported sig. improvements relative to Control.
- 
- Across general Activity Monitors category, evidence evaluating different racial/ethnic groups, adverse events, and cost-effectiveness is currently limited or lacking.
  - Many studies have *relatively short intervention periods* (< 6 months) and have employed a variety of physical activity outcome measures.

- **Computer-tailored Print**
  - Moderate evidence that it has a small but positive effect in general adult population when compared with minimal or no-treatment controls. PAGAC Grade: Moderate (Cohen's  $d$ : 0.12 – 0.35).
- **Interactive Video Games**
  - Limited evidence that use in structured community-based programs is effective for increasing PA in healthy children. PAGAC Grade: Limited
  - Limited evidence that such programs (i.e., “exergames”) are a potentially acceptable and safe approach for use in programs aimed at increasing PA in adults ages 60 years and older. PAGAC Grade: Limited

# Draft Conclusion Statements: Technology - continued

- Mobile Phone Applications
  - Moderate evidence that programs involving text-messaging have small to moderate positive PA effects in general adult population. **PAGAC Grade: Moderate** (effect sizes = 0.40 – 0.50+).
  - Strong evidence that use of smartphone applications (apps) increase regular PA in children & adolescents. **PAGAC Grade: Strong** (Effect Sizes = 0.12 – 0.50+).
  - Limited evidence that smartphone apps increase regular PA in general adult populations. **PAGAC Grade: Limited**
- Social Media
  - Limited early evidence that programs involving *social media* are effective for increasing PA in adults or youth. **PAGAC Grade: Limited** (SMD= 0.07-0.13, though overall pattern generally favored intervention).



# Draft Conclusion Statements: Technology – continued

- Telephone-assisted
  - Strong evidence that telephone-assisted interventions are an effective and safe means for increasing PA in general adult populations, including older adults. **PAGAC Grade: Strong** ( $d: > 0.50$ ).
- Web-based or Internet Delivered
  - Strong evidence that internet-delivered interventions *that include educational components* have small but consistently positive effects in increasing PA in general adult population, particularly in shorter-term, when compared with interventions that do not include internet-delivered materials. **PAGAC Grade: Strong** ( $d: 0.14-0.37$ )
  - Limited, early evidence that these interventions may have some efficacy in increasing short-term PA in persons with type 2 diabetes. **PAGAC Grade: Limited for individuals with type 2 diabetes**

# *Draft* Implications: Technology

- A growing range of info & communication technologies that can reach an increasingly broad spectrum of the population
- Employment of evidence-based behavioral strategies can help increase effectiveness
- Different delivery channels can be used to meet the varying needs of different pop. segments, e.g., age, income, health status groups
- Goal is to develop a broad array of effective options that meet the needs of different target groups
- Could also serve as useful adjuncts to other PA interventions
- Evaluate implementation strategies for 'Strong' interventions (activity monitors, phone-based, apps for youth, internet progs. for adults)

# Draft Research Recommendations: Technology

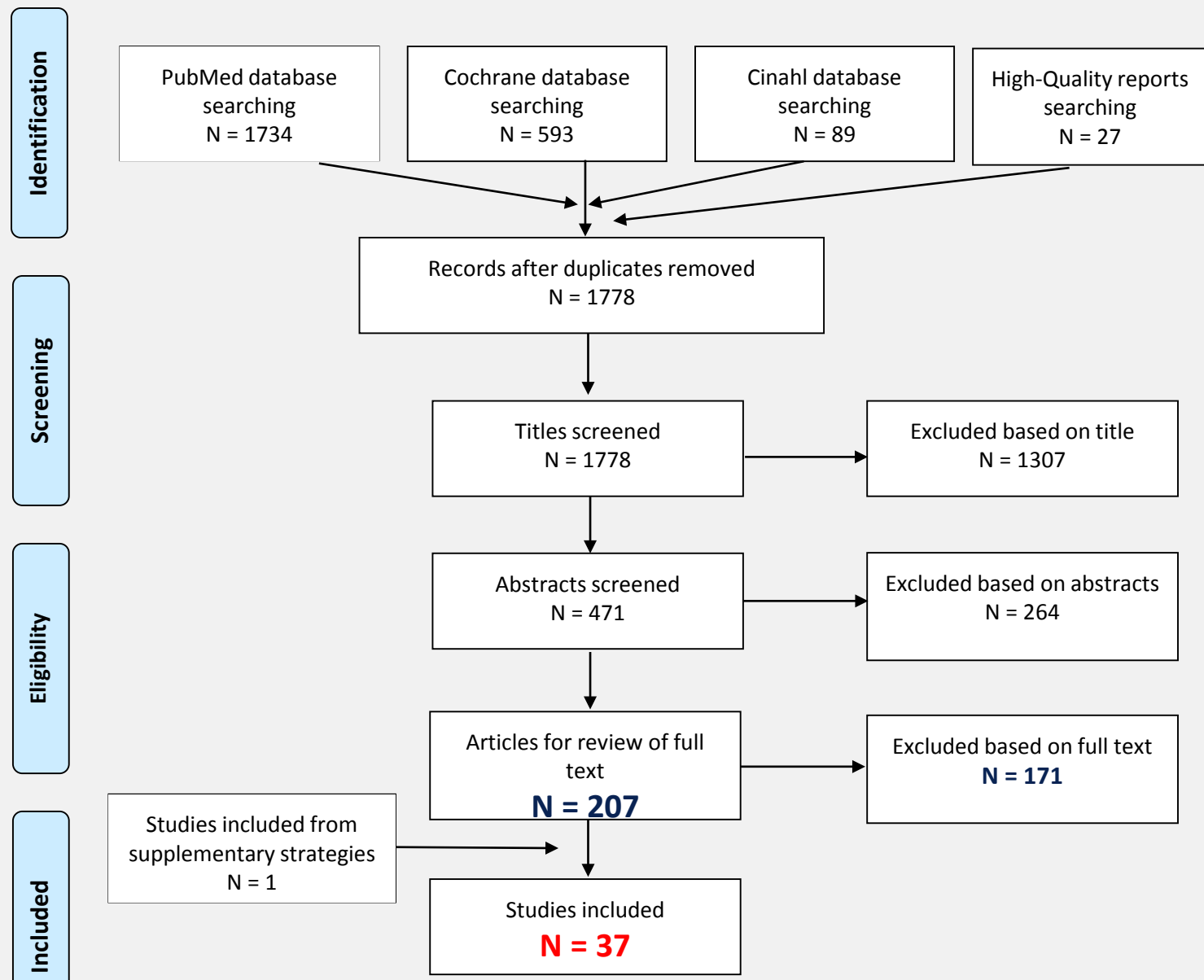
- *Broaden enrollee targets* to increase diversity & generalizability (e.g., racial/ethnic groups, sexes, lower-income & other vulnerable and/or underrepresented groups).
- Employ *experimental designs & longer-term intervention periods* to test ways of enhancing sustained IT use (12+ months).
- Report PA outcomes that are *meaningful* from public health & clinical perspectives (e.g., steps/day, weekly mins of MVPA).
- Capture intervention-related *PA dose-R relations, adverse events, & costs* to aid evaluation, translation, and dissemination.
- Employ additional experimental designs to allow *more rapid testing of information technology interventions* (e.g., fractional factorial designs, adaptive interventions).
- Use experimental designs to test ways of combining PA & other behavs. (diet).

# Community Settings: Definition



- Defined generally as those locales where people gather for educational, housing, consumer-related, health-related, or social purposes.
- A growing number of such settings have served as potentially convenient points of contact in which to deliver PA interventions.

# Search Results Community: Reviews<sup>1</sup> & Reports



<sup>1</sup> Reviews include systematic reviews, meta-analyses, and pooled analyses.

# Description of the Evidence: Community

## 7 sub-categories:

- **Childcare:** 5 Systematic Reviews
- **Community-wide:** 3 Systematic Reviews
- **Faith-based:** 1 Systematic Review
- **Nurse-delivered:** 2 Systematic Reviews
- **Primary Care:** 9 Systematic Reviews, 2 Meta-Analyses, 2 Reviews of Systematic Reviews
- **Schools:** 5 Systematic Reviews, 2 Meta-Analyses
- **Worksite:** 6 Systematic Reviews

# Draft Conclusion Statements: Community

- **Childcare**

- Limited evidence that interventions are effective for PA in this setting for children <6 years of age. **PAGAC Grade: Limited (SMD: 0.07 – 0.44+)**

- **Community-wide**

- Moderate evidence that interventions that employ *intensive contact with majority of target population over time* can increase PA across the population. **PAGAC Grade: Moderate (RR= 1.03 – 1.20)**
- Limited evidence that interventions using strategies *limited in intervention reach or intensity over time* and which focus on a narrow set of strategies are effective in community-wide PA change. **PAGAC Grade: Limited**

- **Faith-based**

- Limited evidence that interventions that are either faith-based (integrated with spiritual aspects) or faith-placed (delivered through setting) are effective for promoting PA in adults. **PAGAC Grade: Limited**

- **Nurse-delivered**

- Limited evidence that nurse-delivered community-based interventions are effective for increasing PA in adults. **PAGAC grade: Limited**

# Draft Conclusion Statements: Community – continued

- **Primary Care** (with healthcare provider assistance or support)
  - Limited evidence for effectiveness in the general population in primary care settings when compared with minimal or usual-care controls, especially over medium (6-11 mos.) or longer (12+ mos.) periods. **PAGAC Grade: Limited**
- **Schools**
  - Moderate evidence that interventions that *revise the structure of physical education (PE) classes* are effective for increasing PA in *primary school-aged youth*. **PAGAC Grade: Moderate (24% more activity)**
  - Limited evidence that interventions that *modify designs of school playgrounds or that change recess sessions in other ways* are effective for increasing PA in *youth*. **PAGAC Grade: Limited**
- **Worksite**
  - Limited evidence that interventions are effective for increasing PA in *adults*. **PAGAC Grade: Limited**



# *Draft* Implications: Community

- While a lot of promising interventions exist in a variety of settings, evidence currently constrained by the quality of research (e.g., designs, outcome measurement, duration).
- Targeting to org.'s needs & preferences can enhance program effectiveness & sustainability.
- Including assessments of cost can provide additional useful information.
- More attention indicated for PA intervention separate from other behavioral interventions (e.g., wellness, etc.).

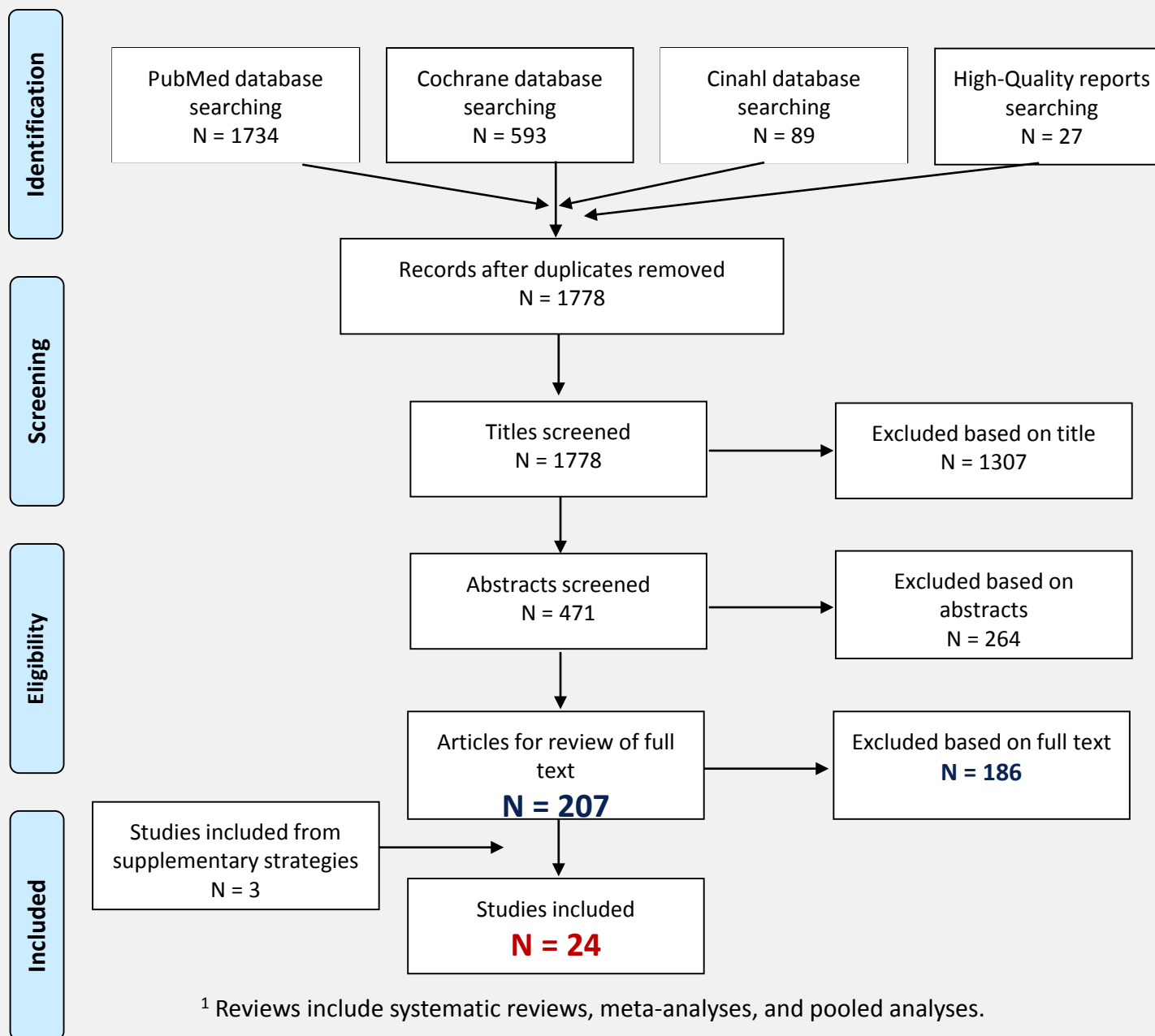
# Draft Research Recommendations: Community

- Conduct *rigorous, experimental trials*, including cluster-randomized designs, to demonstrate efficacy of setting-based approaches to PA.
- Evaluate interventions, using experimental methods, targeted to *specific setting-based contexts & populations*.
- *Broaden enrollment targets* to include more diverse racial/ethnic groups, sexes, locales, & socio-demographics.
- Evaluate targeted uses of *info technologies & related media* approaches in broadening potential reach & efficacy of such community-based programs.
- Apply *relevant behavioral theories* to further guide intervention development & evaluation.

# Individual-level: Definition

- Generally involve delivery of in-person PA advice, support, and/or other behavior change strategies.
- Includes one-on-one or group-delivered interventions.
- Reviews grouped by pop. segment (older adults, post-natal, youth), intervention delivery source (peer-led programs), or intervention type (theory-based programs).

# Search Results Individual: Reviews<sup>1</sup> and Reports



<sup>1</sup> Reviews include systematic reviews, meta-analyses, and pooled analyses.

# Description of the Evidence: Individual

## 5 Sub-categories:

- Older Adults: 3 Systematic Reviews, 1 Meta-Analysis
- Peer-led: 1 Meta-analysis
- Post-natal (0-5 yrs. post-partum; most 0-1 yr.): 2 Systematic Reviews, 1 Meta-Analysis
- Theory-based Behavioral Interventions: 3 Systematic Reviews, 1 Meta-Analysis
- Youth: 2 Systematic Reviews, 2 Meta-Analyses

# Draft Conclusion Statements: Individual

- **Older Adults**
  - Moderate evidence that interventions targeting older adults have small but positive PA effects when compared with minimal/no-treatment controls. **PAGAC Grade: Moderate ( $d= 0.14$ , range= - 0.02 – 0.63)**
- **Peer-led Interventions**
  - Moderate evidence that peer-led self-management interventions are effective in older adults and individuals with chronic disease at producing small but meaningful increases in PA when compared with minimal/no-treatment controls, particularly over time periods of <12 mos. **PAGAC Grade: Moderate (SMD= 0.30 – 1.5).**
- **Post-natal** (0-5 yrs. Post-partum)
  - Limited evidence that postnatal interventions are effective for increasing PA compared with minimal/no-treatment controls. **PAGAC Grade: Limited**

- Theory-based Behavioral Interventions
  - Moderate evidence that behavior change techniques based on a broad range of theories are useful for increasing PA of different types, intensities, & formats in adults. **PAGAC Grade: Moderate** (ES= 0.21-0.35).
  - Limited evidence that providing financial rewards or incentives for reaching PA behavior targets are effective in adults. **PAGAC Grade: Limited**
- Youth
  - Strong evidence that interventions in healthy youth (<18 yrs.) have a small but positive PA effect when compared to a variety of control conditions. (Effects are enhanced when programs incorporate family or are delivered in schools.) **PAGAC Grade: Strong (g= 0.27 – 0.44).**

# *Draft* Implications: Individual

- Programs that address critical developmental periods and life stage transitions could strengthen intervention success over time.
- Promising strategies available to expand the reach and sustainability of programs beyond in-person communications (e.g., peer-led, IT) should be brought into the mix.
- Targeted multi-level approaches could provide the biggest “bang for buck”.



# Draft Research Recommendations: Individual

- Lengthen the intervention & evaluation periods
- Further examine role of self-regulation techniques & related evidence-based strategies in more diverse pop. segments across the age range
- Examine which interventions are effective across life-course transitions (e.g., post-college/1st job, marriage/family, pre-post natal, retirement)
- Systematically test methods for promoting optimal PA over time & within context of multi-health behavior interventions
- Evaluate combinations of interventions from different impact levels, and leverage existing community resources & social support systems

# Committee Discussion

1. What interventions are effective for increasing physical activity at different levels of impact?
  - a) Does the effectiveness vary by age, sex, race/ethnicity, or socio-economic status?
    - We do have several reviews aimed at specific sub-populations (e.g., African Americans, men, low-income); need to identify where best to place them in Chapter
    - *Any topic areas that we have not covered?*

# Next Steps

- Finish evidence review of remaining levels of impact for Q1 (environmental; policy & legislative).
- Complete write-ups of current drafts of 1st three PA levels presented.
- Draft write-ups of remaining two PA levels.
- Complete evidence review and draft write-up of Q2: What interventions are effective for reducing sedentary behavior?