Promotion of Physical Activity

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Experts and Consultants

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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?
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
### 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

#### 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)).

#### Endpoint Health Outcome
Physical activity behavior change
• **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: Reviews¹ and Reports

Identification
- PubMed database searching N = 1734
- Cochrane database searching N = 593
- Cinahl database searching N = 89
- High-Quality reports searching N = 27

Records after duplicates removed N = 1778

Screening
- Titles screened N = 1778
  - Excluded based on title N = 1307

- Abstracts screened N = 471
  - Excluded based on abstracts N = 264

Eligibility
- Articles for review of full text N = 207
  - Excluded based on full text N = 180

Included
- Studies included N = 27

¹ Reviews include systematic reviews, meta-analyses, and pooled analyses.
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
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
• 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).
**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
• 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).
• 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**
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**: Reviews¹ & Reports

**Identification**

- PubMed database searching
  - N = 1734
- Cochrane database searching
  - N = 593
- Cinahl database searching
  - N = 89
- High-Quality reports searching
  - N = 27

**Screening**

- Records after duplicates removed
  - N = 1778

- Titles screened
  - N = 1778
- Excluded based on title
  - N = 1307

- Abstracts screened
  - N = 471
- Excluded based on abstracts
  - N = 264

- Articles for review of full text
  - N = 207
- Excluded based on full text
  - N = 171

**Included**

- Studies included from supplementary strategies
  - N = 1
- Studies included
  - N = 37

¹ 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**
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**¹ and Reports

**Identification**
- PubMed database searching: 1734
- Cochrane database searching: 593
- Cinahl database searching: 89
- High-Quality reports searching: 27

**Records after duplicates removed**: 1778

**Screening**
- Titles screened: 1778
  - Excluded based on title: 1307

**Eligibility**
- Abstracts screened: 471
  - Excluded based on abstracts: 264

**Included**
- Articles for review of full text: 207
  - Excluded based on full text: 186
- Studies included from supplementary strategies: 3

**Studies included**: 24

¹ Reviews include systematic reviews, meta-analyses, and pooled analyses.
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
• 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).
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”.

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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?