모바일 애플리케이션과 모니터링 장치를 이용한 비만 치료

2022.12.10 고대구로병원 박효진

비만의 현재

- 비만은 그 자체로 각종 합병증, 질병에 대한 위험 인자로써 그 어느때보다도 적절한 체중 관리가 중요해짐
- 지난 50년간 과체중/비만 유병률은 꾸준히 증가하였으며,
- 체중 관리는 합병증 예방 및 그로 인한 경제적 부담을 줄일 수 있게 함.

비만의 위험성

- 2016년에 전세계 성인인구의 39%까지 과체중, 그중 13%는 비만 인구
- 이들 인구는
  - type 2 diabetes
  - cardiovascular disease
  - fatty liver disease
  - obstructive sleep apnea
  - Musculoskeletal disorders (such as osteoarthritis)
  - 특정 암 발병 등의 위험도가 증가 & 삶의 질도 감소함.
- 동반된 질환이 있는 비만 환자에 대한 치료의 경우, 더 복잡해지고 더 빠른 치료가 필요해짐

현재의 비만 치료

- 그동안 여러가지 합병증을 동반한 비만 환자들을 GLP-1 analogs 및 다른 약물 치료, bariatric surgery처럼 적극적인 치료를 하는 것 이외의 실질적이고 보다 더 장기적인 체중 감량은 어려웠음.
- 역설적이게도 비만율은 다이어트를 하는 비율이 높음에도 계속 상승하고 있음.

eHealth

- 이런 상황에서 '디지털' 기술의 발전은 비만 치료를 위한 life style modification에 인식의 변화를 주고 있음.
- 휴대폰, 태블릿PC, 컴퓨터와 같은 기술의 발전은 우리의 일상 생활의 큰 일부가 된 것은 명백하나 이것들이 체중관리나 비만 치료의 맥락에서는 아직 정확히 정의되지 않고 있음.

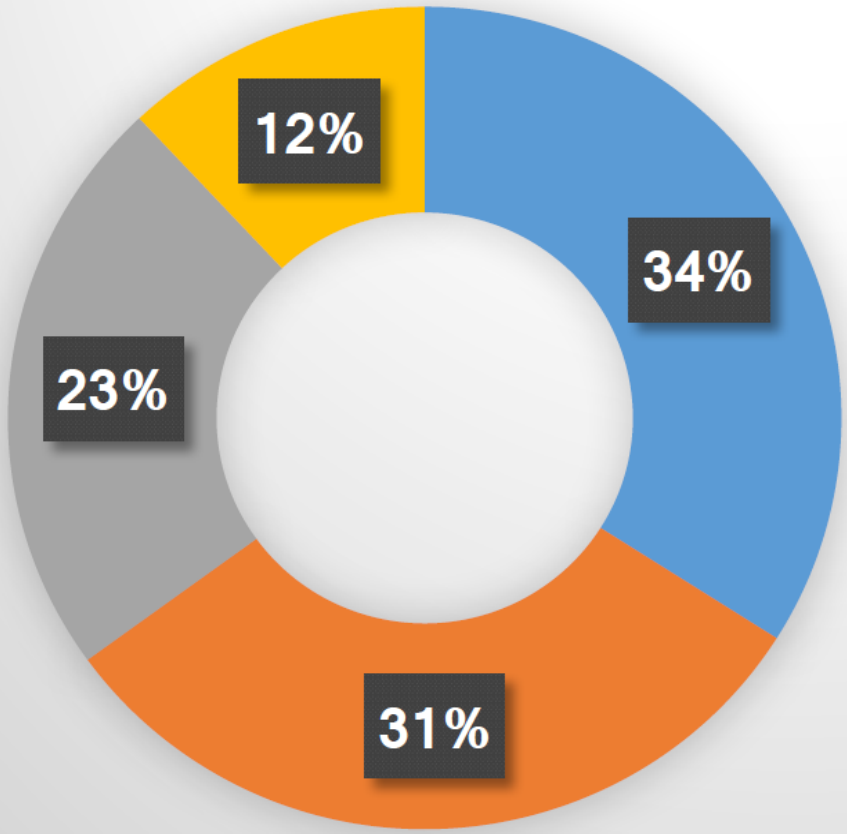
- WHO
  - Electronic Health: eHealth를 의료 기록의 디지털화 및 환자와 의사 사이의 의사소통 및 정보 교환에 있어 통신 기술을 이용해 더 비용-효율적이고 안전하게 의료서비스를 사용하는 것으로 정의하고 있음.

mHealth

- Mobile Health(mHealth)
  - eHealth에 포함되는 개념으로, 모바일의 무선 통신 기술을 이용하는 것을 말한다.
- 이는 단순히 건강한 사람들의 LSM을 위한 것 뿐 아니라 여러 질환들을 한꺼번에 가진 특정 환자들을 대상으로 할 수 있음
- mHealth는 내가 어떤 생활 방식으로 살 것인지를 선택할 수 있게 해주고 본인의 생활 방식을 되돌아 보게 만들 수 있음.

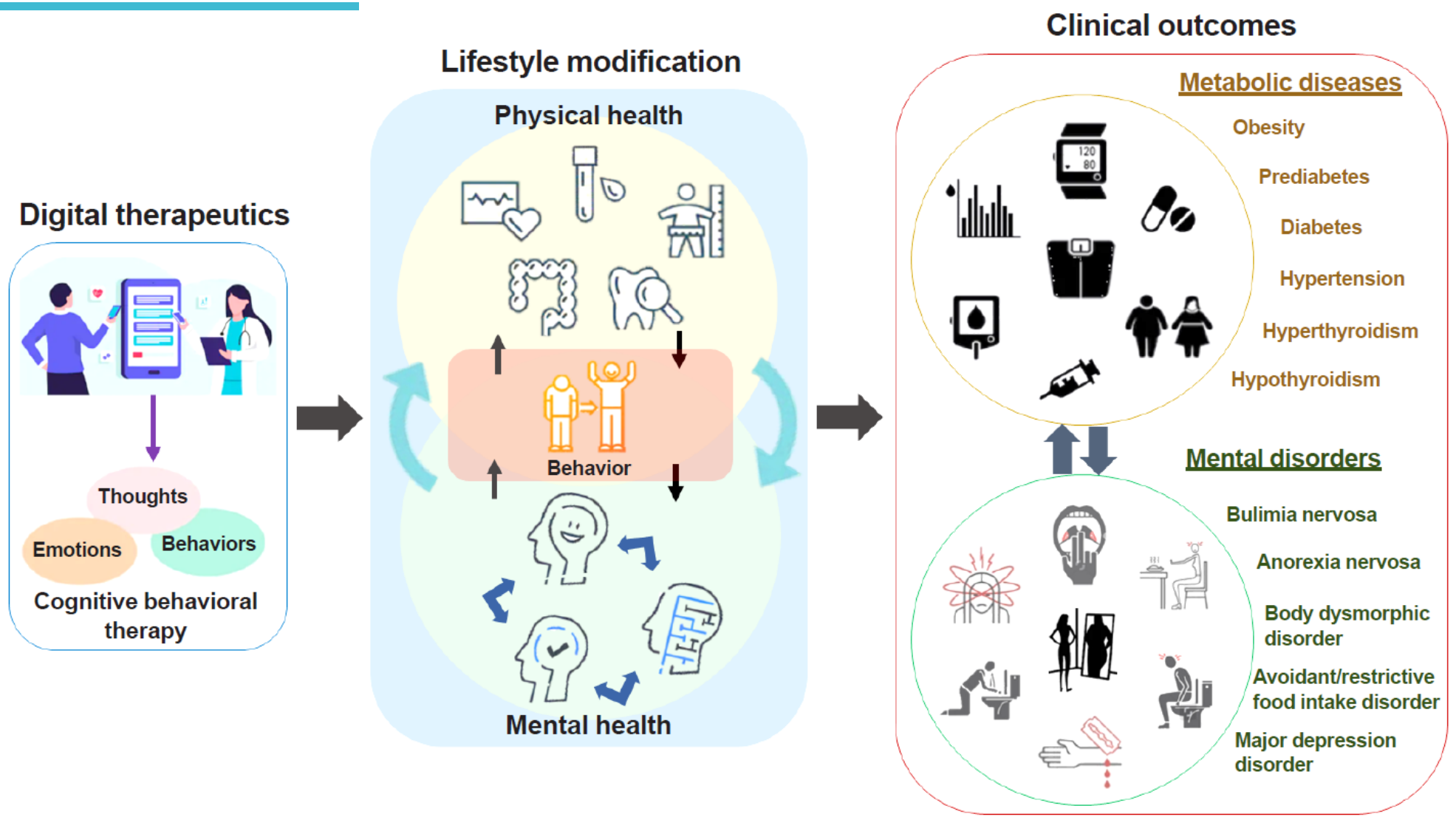
mHealth의 비만 치료에 대한 적용

- 최근 들어 대량의 mHealth application들이 나오고 있음 -> 임상 현장에서 이들이 과연 정말 비만 치료에 도움이 되는가에 대한 연구 및 평가가 매우 필요한 상황
- 현재까지의 mobile application을 이용한 체중 관리, 비만 치료의 주소
- 제한점 및 앞으로의 추가 연구 필요성 및 보완점은?

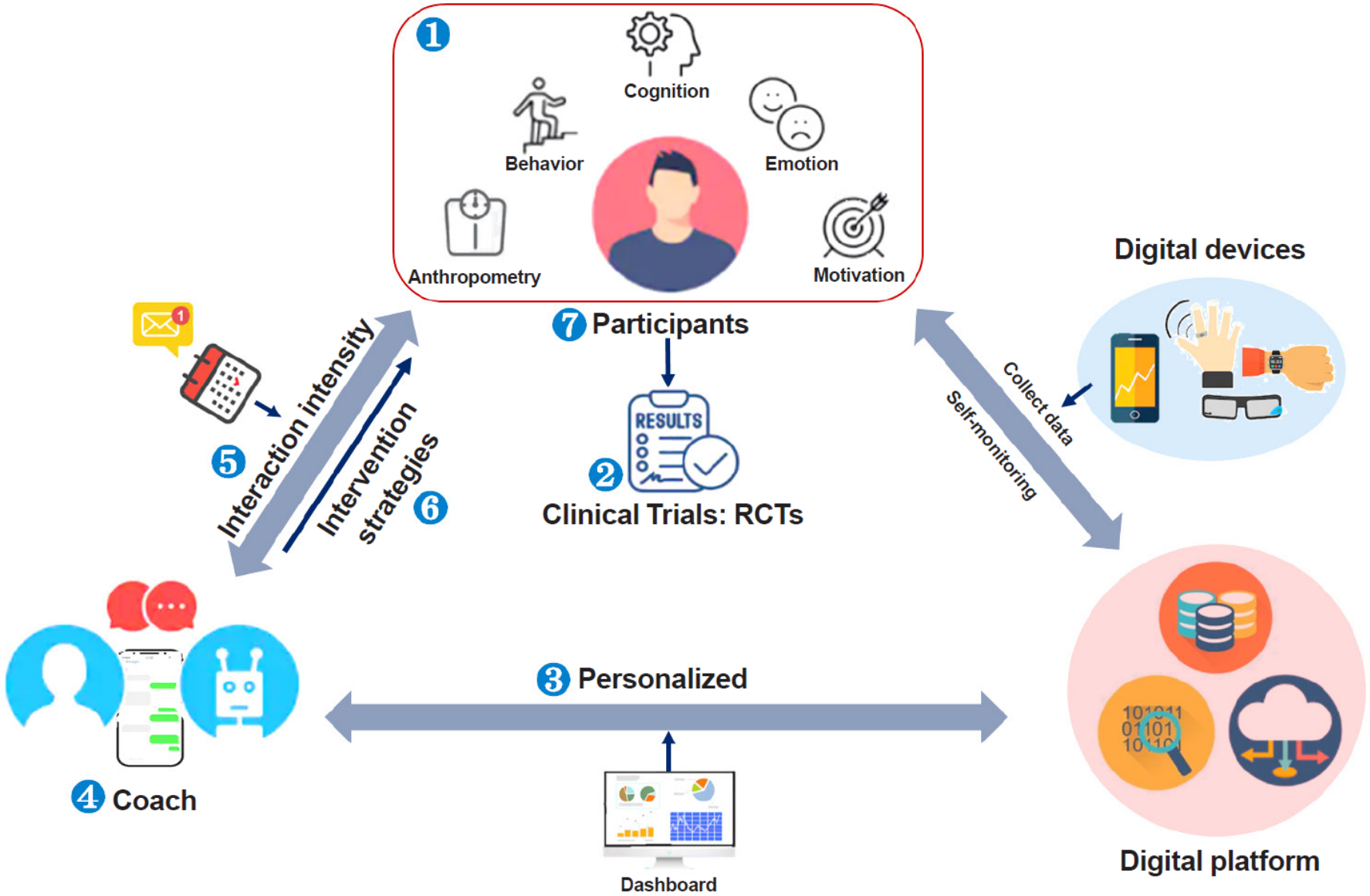


- Fitness/Physical Activity
- Nutrition/Diet
- Body-Weight, exercise, and calorie intake recording and monitoring
- Others (meditation, hypnotherapy, recipes)

Nikolaou, C. K., & Lean, M. E. (2017). Mobile applications for obesity and weight management: current market characteristics. *International Journal of Obesity*, *41*(1), 200-202.



Kim, M., & Choi, H. J. (2021). Digital therapeutics for obesity and eating-related problems. *Endocrinology and Metabolism*, *36*(2), 220.



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Ghelani, D. P., Moran, L. J., Johnson, C., Mousa, A., & Naderpoor, N. (2020). Mobile apps for weight management: a review of the latest evidence to inform practice. *Frontiers in endocrinology*, *11*, 412.

References	Participants	*n*	Intervention (+used App)	Strategy used for change	Study duration	Objective	Effect on anthropometry	Other outcomes
Brindal et al. (32)	Overweight and obese adults	146	I_1 = Static app: recipes and weight loss info; I_2 = Supportive app: I_1 + food intake records, rewards, reviews, reminders	Education, self-monitoring, motivation	24 weeks	Observe effects on weight loss, weight-related biomarkers, and psychological outcomes	No differences in weight loss; ~60% of all participants lost ≥5% of body weight	Reduction in app usage lower in supportive app users; ~39.0% of users were still using the app at week 24.
Patrick et al. (35)	Overweight adults	75	*I* = C + brief monthly phone calls, personalized SMS/MMS messages 2–5 times daily; *C* = monthly weight control printed materials	Education, reinforcement for improved behavior	4 months	Observe effects on weight	Greater weight loss in intervention group after adjusting for sex and age [−1.97 kg difference; average weight loss = 2.88 kg (3.16%) with intervention]	NA
Orsama et al. (36)	Patients with type 2 diabetes aged 30–70 years	48	**Monica application** *I* = Remote patient health reporting + linked health behavior change feedback; *C* = Standard care (diabetes education and counseling)	Self-monitoring + feedback	10 months	Develop and evaluate mobile phone-based remote patient reporting and automated feedback system to improve self-management and health	Greater weight reduction with intervention (−2.1 vs. −0.4 kg)	Greater mean reduction in HbA1c of −0.40%
Oh et al. (37)	Patients with metabolic syndrome	405	**Smart Care service** *I* = App used to transmit daily information on body composition and physical activity; *C* = No app used	Self-monitoring, minimizing time and space restrictions	24 weeks	Assess weight loss and adherence effects	Improved body weight, BMI, body fat percentage, waist circumference among active participants compared with less active, or control participants	No difference in lipid profile changes
Allen et al. (38)	Obese adults	68	***Lose it!* application** I_1 = Intensive counseling intervention; I_2 = Intensive counseling plus *Lose it!*; I_3 = A less intensive counseling plus *Lose it!*; I_4 = *Lose it!* Only	Self-management, mindful empowerment, real time feedback, and motivators	6 months	Evaluate feasibility, acceptability, and efficacy of behavioral interventions delivered by smartphone technology	Weight loss and reduced BMI was greater in I_2 (−5.4 kg; −1.8 kg/m^2) and I_3 (−3.3 kg; −1.1 kg/m^2) compared with counseling alone (I_1 = −2.5 kg; −0.8 kg/m^2) or app alone (I_4 = −1.8 kg; −0.7 kg/m^2)	NA
Nollen et al. (39)	Low-income, racial/ethnic-minority girls aged 9–14 years	51	*I* = App based on behavioral weight control principles; *C* = No intervention	Self-monitoring, real time goal setting, providing feedback, and reinforcement	12 weeks	Pilot study examining the effect of a mobile technology as a stand-alone intervention to prevent obesity	No change in BMI	Trends toward increased consumption of fruit and vegetables (+0.88, $p = 0.08$) and decreased sugar sweetened beverages (−0.33, $p = 0.09$). No change in screen time
Burke et al. (40)	Overweight and obese adults	210	**Dietmate Pro**© I_1 = PDA; I_2 = PDA + daily feedback; *C* = Paper diary	Self-monitoring	24 months	Examine the effect of PDA on weight loss and maintenance	No differences in weight loss between groups, PDA + feedback group lost weight compared to baseline	Adherence to dietary self-monitoring was the strongest predictor of weight loss
Ross and Wing (41)	Overweight and obese adults	80	I_1 = Technology-based tools (TECH); I_2 = Technology-based tools + phone-based intervention (TECH + PHONE); *C* = Standard self-monitoring tools	Self-monitoring	6 months	Examine the efficacy of self-monitoring technology, with, and without phone-based intervention	Weight loss differed at 6 months between groups; trend for TECH + PHONE to lose more weight than control (−6.4 vs. −1.3 kg); fewer controls achieved ≥5% loss (15 vs. 44% in the other groups)	Adherence to self-monitoring calorie intake was higher in TECH + PHONE than TECH or controls

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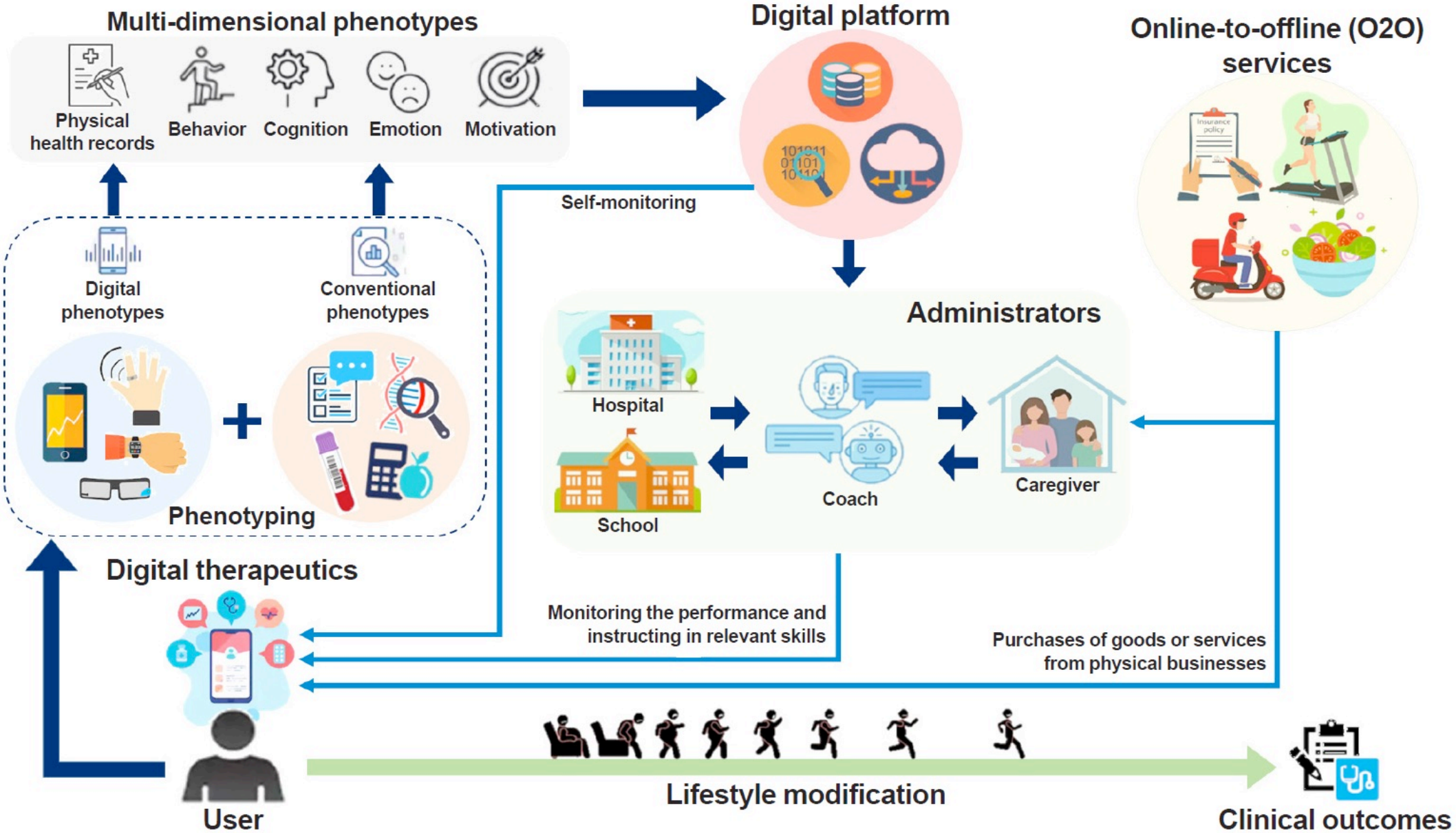
References	Participants	*n*	Intervention (+used App)	Strategy used for change	Study duration	Objective	Effect on anthropometry	Other outcomes
Carter et al. (14)	Overweight adults	128	**My Meal Mate application** I_1 = Mobile app; I_2 = Website; C = Paper diary	Goal setting, self-monitoring, feedback	6 months	Compare acceptability and feasibility of self-monitoring weight management intervention delivered by an app, website, or paper diary	Mean change in weight ($I_1 = -4.6$, $I_2 = -1.3$, $C = -2.9$ kg); BMI ($I_1 = -1.6$, $I_2 = -0.5$, $C = -1.0$ kg/m^2); and body fat ($I_1 = -1.3\%$, $I_2 = -0.5\%$, $C = -0.9\%$) greater in app group at 6 months	Retention was higher in app group (93 vs. 55% web and 53% diary). Self-monitoring declined over time in all groups
Pellegrini et al. (15) and Spring et al. (42)	Obese adults aged 18–60 years	96	**ENGAGED application** I_1 = Tech-supported (eight group sessions + coaching calls + app); I_2 = Standard (eight group sessions + coaching calls + paper diary); C = Self-guided (lifestyle DVDs + paper diary)	Self-monitoring, using a food database of over 50,000 foods and social network features	6 months	Examine effect on weight loss + within-person variation in dietary self-monitoring in the tech-supported group	Greater weight loss in tech-supported and standard than self-guided groups (−5.7 kg vs. −2.7 kg). More participants in the standard group achieved weight loss ≥5% compared to tech-supported group	No difference in weight loss at 12 months. Less recording over time in the tech-supported group. Fewer foods reported on weekends and more foods self-monitored in January vs. October but no seasonal effect observed
Zhou et al. (43)	Healthy adults	64	I = Mobile app with adaptive personalized daily step goals; C = Active control with steady step goal of 10,000	Adaptive goal setting, self-monitoring	10 weeks	Evaluate efficacy of an automated phone-based goal-setting intervention using machine learning with no in-person contact or counseling	Weight and BMI were measured but effects after intervention were not reported	Mean daily step count decreased by 390 steps in intervention group vs. 1,350 steps in controls from run-in to 10 weeks. Net difference = 960 in daily steps
Thomas et al. (44)	Overweight and obese adults	276	I_1 = GROUP-based: weekly, biweekly, monthly meetings (6 months), paper diaries, feedback; I_2 = SMART-based: online lessons, feedback, monthly weigh-ins; C = CONTROL: paper diaries, feedback, monthly weigh-ins	Self-monitoring	18 months	Assess differences in weight loss between smartphone-based vs. intensive group-based behavioral obesity treatments vs. control	No difference in mean weight change	8-month retention was significantly higher in both GROUP (83%) and SMART (81%) compared with CONTROL (66%)



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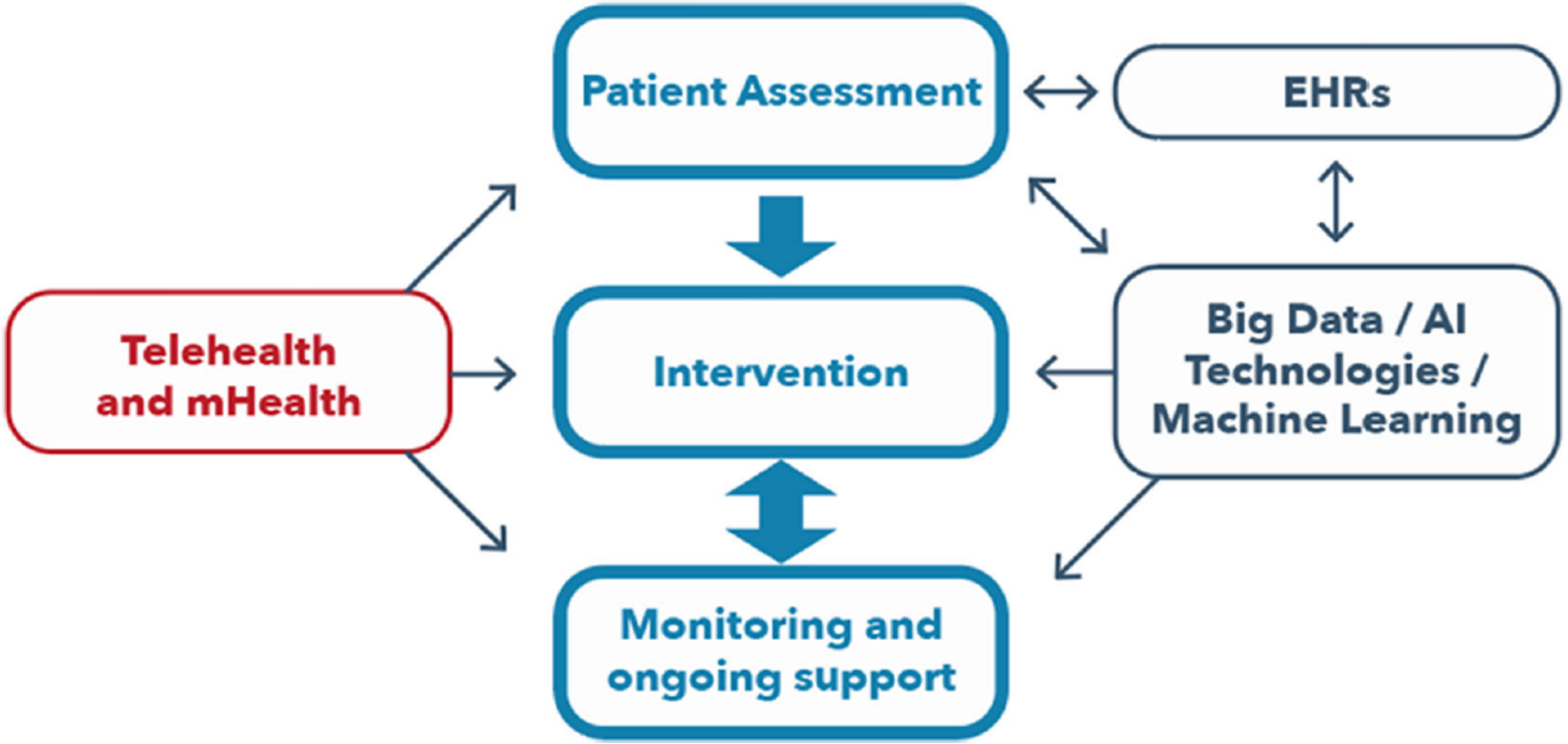


Hinchliffe, N., Capehorn, M. S., Bewick, M., & Feenie, J. (2022). The Potential Role of Digital Health in Obesity Care. *Advances in Therapy*, 1-16.

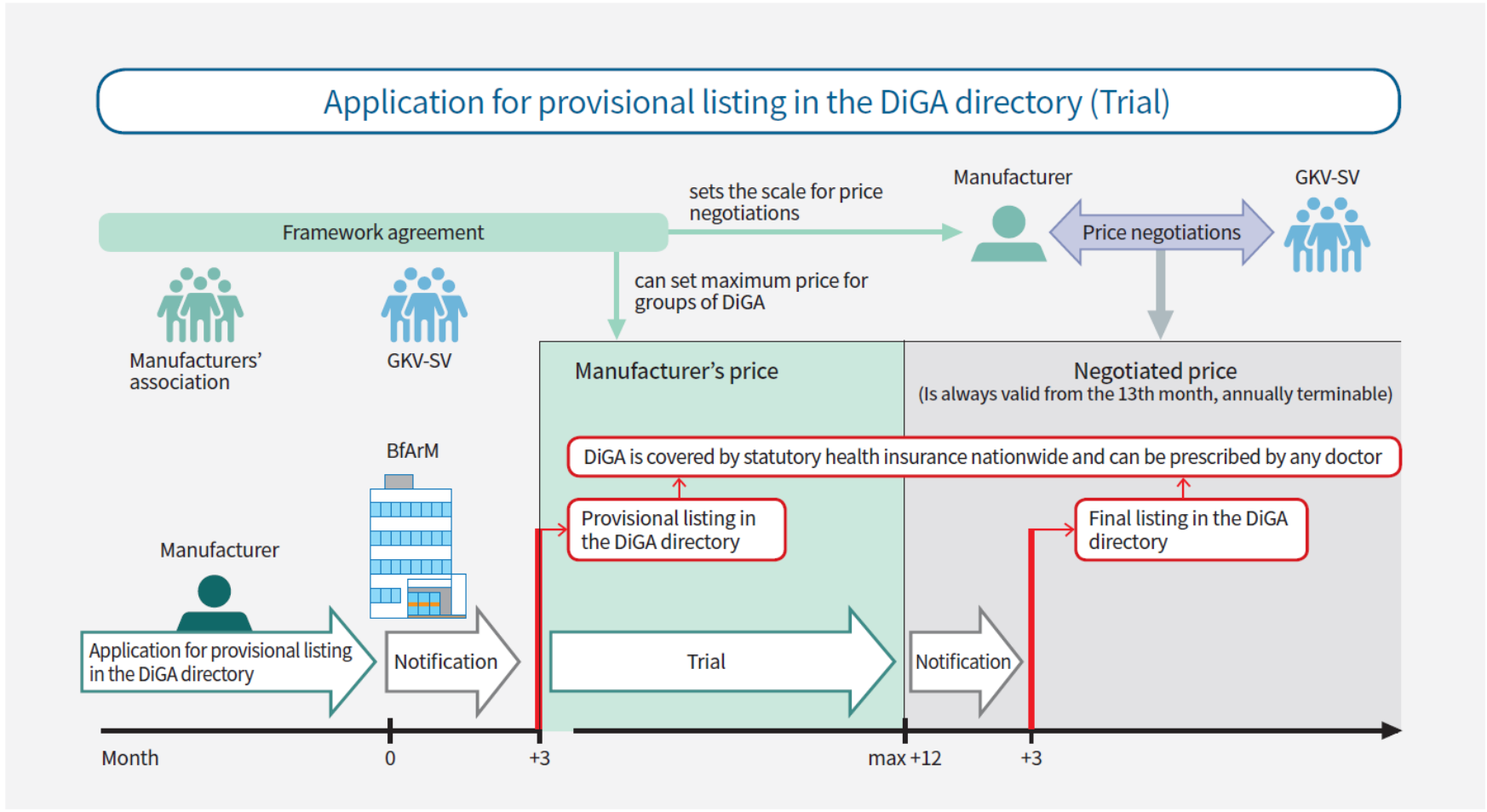
해외 사례

- 독일
- 2019년 11월 디지털의료법(Digitale-Versorgung-Gesetz, DVG)을 제정하여 치료목적의 10개 항목에 대한 애플리케이션(MTRC, 2020)에 대해 건강보험 급여를 실시

해외 사례

- 업체는 신속도입 절차에 따라 식약처(BfArM)8)에 신청서를 제출 -> 3개월 이내 데이터보호, 긍정적 효과 등에 따라 조건부 등재 여부를 결정
- 그 다음 1년 이내에 치료에 미치는 영향에 대한 근거(치료개선의 의학적 혜택, 절차적 및 구조적 개선)를 제출한 후 3개월 이내에 정식 등재여부를 결정
- 수가 협상은 중앙연방건강보험기금협회과 업체가 협의하여 결정하는 방식
- 급여 기준: BfArM 등록, 보험자의 승인, 의사 등의 처방이 있어야 하며, 치료과정에 사용되고, 위험도 가 낮은 의료기기(EU MDR I 등급 또는 IIa 등급)이어야 함.

해외 사례


Application for provisional listing in the DiGA directory (Trial)
Framework agreement
sets the scale for price negotiations
Manufacturer
GKV-SV
Price negotiations
can set maximum price for groups of DiGA
Manufacturers' association
GKV-SV
Manufacturer's price
Negotiated price
(Is always valid from the 13th month, annually terminable)
BfArM
DiGA is covered by statutory health insurance nationwide and can be prescribed by any doctor
Provisional listing in the DiGA directory
Final listing in the DiGA directory
Manufacturer
Application for provisional listing in the DiGA directory
Notification
Trial
Notification
Month
0
+3
max +12
+3

zanadio

aidhere GmbH

5만+
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3
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