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Active commuting and its impact on body composition

Bachelor's thesis in Human Movement Science BEV2900
Supervisor: Ingebrigt Meisingset
March 2024

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Abstract

Purpose: The obese population has increased by approximately 12% from 1998 to 2019, partly due to sedentary behaviour. Incorporating active commuting in daily living such as cycling, walking or public transport can simplify achieving the World health Organization's recommendations regarding physical activity. The aim of this review is to examine if incorporating active commuting among adults can result in alterations in body composition. **Method:** This review includes eight primary articles from the databases: PubMed, Oria and SportDiscus. The studies were conducted on the adult population from the age of 18 and contained measurements from both baseline and follow-up. **Results:** Six of the elected studies found that active commuting could lead to a positive change in body composition. The evidence exhibits a larger decrease in cycling groups compared to walking and public transportation. **Conclusion:** There is reason to assume that incorporating active commuting among adults can lead to alterations in body composition, however uniform conclusions are complicated to draw considering the limited selection of relevant articles, differences in measurement methods, limitations and study design. To achieve more precise knowledge, there is a necessity for more research specifically investigating the effects of active commuting on body composition.

Abstrakt

Bakgrunn: Den overvektige befolkningen har økt med omtrent 12% fra 1998 til 2019, delvis på grunn av inaktivitet. Å benytte aktiv reising i dagliglivet, for eksempel gange, sykling eller offentlig transport kan gjøre det enklere å oppnå verdens helseorganisasjons anbefalinger om fysisk aktivitet. Målet med denne litteraturstudien er å undersøke om praktisering av aktiv reising blant voksne kan resultere med endringer i kroppssammensetning. **Metode:** Litteraturstudien tar i bruk åtte primærartikler fra ulike databaser: PubMed, Oria og SportDiscus. Studiene ble gjennomført på voksne over 18 år og inneholdt målinger før og etter intervensjon. **Resultat:** Seks av studiene fant at aktiv reising kan resultere med positive endringer i kroppssammensetning. Undersøkelsene kom frem til en større nedgang ved bruk av sykkel sammenlignet med gange og offentlig transport. **Konklusjon:** Det er grunn til å anta at aktiv reising kan medføre en endring i kroppssammensetning, men det er problematisk å trekke enhetlige konklusjoner på bakgrunn av begrenset utvalg av artikler, forskjellige målemetoder, studiedesign og metodiske begrensninger ved studiene. For å oppnå mer

enhetlige konklusjoner angående endring i kroppssammensetning er det behov for ytterligere forskning, spesielt angående effekt av aktiv reising.

Key words: BMI, Body Fat, Body weight

1. Introduction

The World Health Organization (WHO) indicates that approximately 150 minutes of moderate physical activity per week can enhance physical health in the adult population (1). Physical activity with moderate intensity is defined as a consumption of three to six times as much energy per minute compared to sitting still (2). People have in recent years become more sedentary in daily life, partly due to development of motorized vehicles. In Norway today there are approximately 3 million registered private vehicles in contrast to about 135 thousand, 65 years ago (3). In addition, the emergence of fast-food restaurants, a large alcohol consumption and low amount of exercise can eventually impact obesity. The obese population has increased by approximately 12% from 1998 to 2019 (4). The growth of obesity can possibly increase the risk of mortality, the emergence of cancer, cardiorespiratory- and musculoskeletal disorders (5).

Today obesity is defined as body mass index (BMI) exceeding 30 kg/m^2. BMI serves as an indicator for assessment of obesity and is calculated by Formula of Keys, which implies dividing body weight and height squared (6). BMI highly correlates with body weight since height constitutes a consistent measurement. In addition, BMI serves as an indirect measure of body composition which is defined as body fat relative to fat- free mass (7). High amounts of body fat can increase cholesterol and risk of diseases such as cancer, the body's responsiveness to insulin, strokes and heart attacks (8). In order to reduce body fat, energy expenditure is required to exceed energy intake which can be achieved by an increased amount of physical activity.

Incorporating active commuting in daily living such as cycling, walking or public transport can simplify achieving the WHO recommendations regarding physical activity. Research from previous studies establish the effect of active commuting on factors such as cardiorespiratory fitness, cholesterol and insulin sensitivity. By examining commuter cycling from the studies mentioned above, cardiorespiratory fitness and insulin sensitivity was increased while LDL-cholesterol decreased (9–11). In regards, this review aspires to examine the effects active commuting has on other physiological traits: body weight, body fat, and BMI. Methods of measurements such as body weight scales, DXA scan and Callipers for measuring skinfold thickness are all easily feasible when collecting data regarding body composition. In addition, the data is simple to use when evaluating change over time by subtracting post- from pre measurements. While there are several studies that review active commuting and its effect on physical health, there are few studies focusing on the effect active commuting has on body composition. Therefore, our aim is to examine if "incorporating active commuting among adults can result in alterations in body composition?"

2. Method

This review includes articles from three international databases: PubMed, Oria and SportDiscus. The predefined combination of keywords used to conduct the search were: "Active commuting OR commuting OR commute AND body composition". The inclusion criteria specified peer-reviewed articles written in English, published within the last 15 years, conducted on adults from the age of 18, in addition to measurements from both baseline and follow-up. Literature not meeting the inclusion criteria were excluded in all databases.

In PubMed, randomized control trials were added as a subject which was not possible in the other databases. The search presented n=18, where four of them had relevant titles. In Oria the subjects cycling, bicycling and commuting were added and social sciences removed. The search gave n=159 and there were 17 relevant titles. In SportDiscus the subjects: cycling, transportation, walking, commuting, bicycle commuting, commuters and bicycles were added. The search provided n=158 and there were nine relevant titles. After the search, Zotero was implemented to screen for duplicates and resulted in n=122. After screening titles and abstracts 29 relevant articles were retrieved for full text analysis. Among these, four articles were utilized in this review. Screening the list of references from the 29 articles mentioned, four new articles were detected and utilized. Therefore, in total eight primary articles were chosen for this review.

3. Results

Table 1: *Characteristics from the eight primary studies*

Author	Study design	Country & duration	Sample size	Data collection BC	Data collection AC	Intervention
Blond et al. (2019)	RCT	Denmark 6 months	TOTAL: n= 129 CON: n= 18 BIKE: n= 34 MOD: n= 39 VIG: n= 38	**Body weight and height** Body weight scale (Seca 767) **Body composition** DXA scan (DPX-IQ) **Waist circumference**	GPS	**Groups:** IG-C, MOD, VIG CON: no change **Intervention exercise groups:** Women EEE: 1600 kcal/week Men EEE: 2100 kcal/week -5 days/week
Flint et al. (2016)	Cohort study	United Kingdom 4 years	TOTAL: n= 4270 Car to active/PT: n= 2993 Active/PT to car: n= 1277	**Height** Stadiometer (Seca 202) **Body weight** Tanita (BC-418 MA) **BMI** Formula of Keys	Questionnaire at both time points	**Groups:** Car to active/PT Active/PT to car **Intervention:** No specific interventions
Martin et al. (2015)	Cohort study	United Kingdom 2 years	TOTAL: n= 4056	**Body weight and height** Self-reported **BMI** Formula of Keys	Questionnaire at both time points	**Groups:** Car to active/PT Active/PT to car. **Intervention:** No specific interventions

Mytton et al. (2016)	Cohort study	United Kingdom 1 year	TOTAL: n= 809	**Body weight and height** Self-reported **BMI** Formula of Keys	Four annual questionnaires	**Groups:** Walking IG-C **Intervention:** No specific interventions
Møller et al. (2011)	RCT	Denmark 8 weeks	TOTAL: n= 48 IG: n= 25 CON: n= 23	**Height** Stadiometer **Body weight** Beam scale (SV-seca 710) **Skinfold thickness** Harpenden calliper **BMI** Formula of keys	Distance recorder and diary	**Groups:** IG-C CON: no change **Intervention exercise groups:** Minimum 20 min daily commuter cycling. Self-selected intensity
Peterman et al. (2016)	Cohort study	USA 4 weeks	TOTAL: n= 20	**Body fat, BMI, body weight, lean mass, and height** DXA scan (GE LUNAR DXA)	GPS	**Groups:** Pedelec three times/week 40 min/day
Sareban et al. (2020)	RCT	Austria 12 months	TOTAL: n= 73 Distribution 2:1 fashion in IG and CON	**Body weight, height, waist and hip circumference** Standardized procedures **BMI** Formula of Keys **Skinfold thickness**	Daily self-reported commuting habits, verified by GPS	**Groups:** IG-PT IG-C CON: no change **Intervention exercise groups:** 150 min/week with moderate physical activity

				Harpenden calliper		
Schmied et al. (2020)	RCT	Switzerland 12 months	TOTAL: n= 73 IG: n= 51 CON: n= 22	**Body weight, height, waist and hip circumference** Standardized procedures **BMI** Formula of Keys **Skinfold thickness** Harpenden calliper	Daily self-reported commuting habits, verified by GPS. (Quality of life questionnaire)	**Groups:** IG-PT IG-C CON: no change **Intervention exercise groups:** 150 min/week with moderate physical activity

CON: control group, MOD: moderate intensity, VIG: vigorous intensity, EEE: exercise energy expenditure, DXA: Dual energy X-ray absorptiometry, IG: intervention group, IG-C: intervention group cycling, PT: public transportation, IG-PT: intervention group public transport, PA: physical activity, BC: body composition, AC: active commuting, RCT: Randomized control trial

Table 2: *Results from the eight primary studies*

Author	**Alterations in intervention group**		**Alterations in control group**		**Comparison between groups**
Blond et al. (2019)	**IG-C** <u>Baseline</u> *BW: 89.9kg *BMI: 29.6kg/m^2 *FFM: 54.7kg *BF: 34.4kg *WC: 95cm ^IAAT: 1824g	**IG-C** <u>Alterations</u> *BW: - 3.6kg** *FFM: 0.6kg *BF: - 4.2kg** *WC: -2.9cm ^IAAT: - 323g**	**CG** <u>Baseline</u> *BW: 91.7kg *BMI: 30.1kg/m^2 *FFM: 52.5kg *BF: 36.1kg *WC: 96cm ^IAAT: 2019g	**CG** <u>Alterations</u> *BW: 0.4kg *FFM: 1.2kg *BF: 1.9kg *WC: 0.1cm ^IAAT: 176g	The IG- C had a reduction in body fat and weight compared to CON

Flint et al. (2016)	**Active/PT to car:** 0.32 kg/m^2 increase in BMI** **Car to active/PT:** 0.30 kg/m^2 decrease in BMI**		No control group		No CON *(95% CI)*
Martin et al. (2015)	**Active/PT to car:** 0.34 kg/m^2* increase in BMI **Car to active/PT:** 0.32 kg/m^2* decrease in BMI		No CON		No CON *(95% CI)*
Mytton et al. (2016)	**IG-C** 1.14 kg/m^2 decrease in BMI**	**Walking** no significant change	No CON		No CON *(95% CI)*
Møller et al. (2011)	**IG-C** <u>Baseline</u> *ST: 134.2mm *BMI: 26.7kg/m^2	**IG-C** <u>Alterations</u> *ST: - 17,2mm**	**CON** <u>Baseline</u> *ST: 138.2mm *BMI: 27.7kg/m^2	**CON** <u>Alterations</u> *ST: - 1.2mm	Greater alteration in body fat in the IG group vs CON with a significant difference of 12.1mm
Petermann et al. (2016)	**Pedelec** <u>Baseline</u> *BF: 28.6kg *BMI: 26.8kg/m^2 *BW: 79kg *LM: 47.3kg	**Pedelec** <u>Alterations</u> *BF: - 0.4kg *BMI: -0.1kg/m^2 *BW: -0.4kg *LM: 0.1kg	No control group		No CON

Sareban et al. (2020)	**IG-PT** Baseline *BW: 73.5kg *WC: 89.1mm *HC: 103.3mm *BMI: 25.8kg/m^2 *ST: 83.2mm	**IG-PT** Alteration *BW: - 0.4kg *WC: - 1.6mm *HC: - 1.3mm *BMI: - 0.2kg/m^2 *ST:- 9mm	**CON** Baseline *BW: 77.7kg *WC: 92.6mm *HC: 101.8mm *BMI: 26.4kg/m^2 ST: 88.9mm	**CON** Alterations *BW: 0.9kg *WC: - 0.3mm *HC: 1.5mm *BMI: 0.3kg/m^2 *ST: - 8mm	No statistically significant results regarding body composition and no difference between groups. *(95% CI)*
	IG-C Baseline *BW: 78.7kg *WC: 91.9mm *HC: 104.1mm *BMI: 26kg/m^2 *ST: 80.8mm	**IG-C** Alterations *BW: 0.4kg *WC: 0.5mm *HC: 0.1mm *BMI: 0.1kg/m^2 *ST: - 3mm			
Schmied et al. (2020)	**IG-PT** Baseline *BW: 73.5kg *WC: 89.1mm *HC: 103.3mm *BMI: 25.8kg/m^2 *ST: 83.2mm	**IG-PT** Alterations *BW: - 0.4kg *WC: - 1.6mm *HC: - 1.3mm *BMI: - 0.2kg/m^2 *ST: - 9mm	**CON** Baseline *BW: 77.7kg *WC: 92.6mm *HC: 101.8mm *BMI: 26.4kg/m^2 ST: 88.9mm	**CON** Alterations *BW: 0.9kg *WC: - 0.3mm *HC: 1.5mm *BMI: 0.3kg/m^2 *ST: - 8mm	No significant relation between active commuting and dose-response on body composition
	IG-C Baseline *BW: 78.7kg *WC: 91.9mm *HC: 104.1mm *BMI: 26kg/m^2 *ST: 80.8mm	**IG-C** Alterations *BW: 0.4kg *WC: 0.5mm *HC: 0.1mm *BMI: 0.1kg/m^2 *ST: - 3mm			

BW: body weight, FFM: fat free mass, BF: body fat, WC: waist circumference, IAAT: intra-abdominal adipose tissue, ST: skinfold thickness, LM: lean mass, HC: hip circumference, WC: waist circumference, IG: intervention group, CI: confidence interval. ***=mean ^=median **=P<0.05**

3.1 Body fat

Six of the elected studies found that active commuting can lead to a positive change in body composition (9,10,12–15), which strongly correlates to a decrease in body fat. Firstly, Blond et al. (9) concludes with a 15-20% decrease in intra-abdominal adipose tissue in all exercise groups with the most noticeable change in waist circumference. Secondly, Møller et al. (10) found a significant decrease in body fat when comparing the IG-C and CON resembling Schmied et al. (16) which found that IG-C had a larger reduction in body fat compared to the IG-PT. The study conducted by Peterman et al. (12) also concluded with a small change in body composition, including a reduction in body fat.

3.2 Body weight and BMI

Numerous studies examined BMI as an indirect measurement of body composition. Flint et al. (14) and Martin et al. (13) found a decrease in BMI in those who transitioned from car to public or active transportation. Additionally, Mytton et al. (15) found that active commuting could contribute to prevention of weight gain and reduced BMI in working adults. While Blond et al. (9) and Peterman et al. (12) had no follow up results regarding BMI, body weight decreased in both studies. In contrast, two studies conclude with no significant change in body composition (11,16).

3.3 Dose- response

Elaborating on the effect active commuting has on body composition, four studies also take dose-response into account (10,13,15,16). Three studies indicate that dose-response has a positive effect on body composition (10,13,16). Firstly, Schmied et al. (16) found a more noticeable dose-response relation in IG-C than IG-PT. Secondly, Møller et al. (10) found a significant dose-response in IG-C compared to CON. Thirdly, Martin et al. (13) indicated a stronger dose-response relationship when excluding shorter commutes. In contrast, Mytton et al. (15) showed no evidence of a dose-response effect.

4. Discussion

The eight primary studies all present results both regarding the effect of active commuting on physical activity and body composition including BMI, body weight and body fat. The entirety of the studies aside from Sareban et al. (11) and Schmied et al. (16) found some positive change in body composition. After actively commuting the most prominent outcomes were alterations in body fat and BMI (9,10,12–15). In addition, four studies also found that dose-response had an impact on body composition (10,13,15,16). Body composition is measured using various methods of measurements, which might make it difficult to draw uniform conclusions. This review compares measurements regarding body fat and BMI which are included in multiple studies. Accordingly, excluding measurement methods that are utilized in a singular study such as fat free mass and lean mass (9,12), simplifying comparison of the results.

4.1 The impact of active commuting on physical activity

After assessing the eight primary studies, results indicate that active commuting has a positive effect on physical activity and health. Previous studies found that actively commuting for six months increased cardiorespiratory fitness and insulin sensitivity in comparison to a control group (9). These findings were supported by Reich et al. (17) that established an increase in exercise capacity and overall physical activity in all exercise groups. In addition, the study also suggests that active commuting among adults reduces mortality which is beneficial to the population especially due to the emergence of obesity. There is also evidence supporting that commuter cycling induced a decrease in LDL-cholesterol minimizing the probability of cardiovascular diseases (18). Conversely, there was no observed decrease in HDL-cholesterol (11), however in the study by Kwaśniewska et al. (19) active commuting was associated with lower HDL. Hence, there are disagreements regarding the magnitude of impact that active commuting has on alterations surrounding physical activity and health.

Cardiorespiratory fitness was the primary emphasis in most of the studies utilized in this review with body composition assessed as a secondary outcome (9,10,12). This is evident in the study conducted by Blond et al. (9) where the intervention corresponded to the primary emphasis and led to a four percent decrease in body weight. On the contrary, if the primary emphasis had been to alter body composition, the results could differ partly due to change in intervention. Implementing an intervention adapted to enhance body composition increases the possibility of assessing active commuting and its effects. To attain more knowledge of active commuting on body composition there is a necessity for further research.

4.2 The impact of active commuting on body composition

Quantity of alteration in body composition varies between the intervention groups; cycling, walking and public transport. Studies implementing specific interventions such as minutes per day spent actively commuting, degree of intensity and exercise energy expenditure (9,10,12), found various indications of decrease in body fat. This indicates that greater intensities, higher exercise energy expenditure or actively commuting over extended distances could lead to a greater alteration in body fat. The most prominent effect on BMI was detected in IG-C (15) and could possibly be a result of cycling inducing a higher exercise energy expenditure than walking and public transport. Furthermore, some studies resulted in a decrease in body weight (9,12) which is equivalent to a decrease in BMI. Peterman et al. (12) found a relatively small decrease in body weight which might be due to mode of commute, or duration. The duration might have been insufficient in order to achieve a significant alteration in body weight. This could be attributed to exercise energy expenditure being higher when cycling in comparison to walking and public transportation. Both Peterman et al. (12) and Blond et al. (9) implement commuter cycling in various forms, such as cycling and pedelecs. Exercise energy expenditure is higher in cycling compared to pedelecs which might have affected the alterations in body weight. Therefore, a higher daily duration of pedelec use may be required to achieve equivalent outcomes for both pedelecs and cycling. In addition, the most prominent results regarding body fat were also found in the IG-C compared to walking. In order to achieve the same exercise energy expenditure for both intervention groups, the commute might have to be extended due to MET being higher when cycling (20). In that regard, dose-response could also influence body composition outcomes.

The effect of dose-response on body composition differs substantially among studies. By increasing the commuter distance, the effect could be amplified. This was established in the study conducted by Martin et al. (13) where shorter commutes were excluded. On the other hand, Blond et al. (9) found that alterations in body weight could be affected by the participants having a BMI in the lower limit at baseline, making weight loss harder to achieve. Conversely, the study indicates a more rapid decrease in subjects who are obese at baseline. There is some indication that greater activity exceeds lesser, however there is a necessity for further examination regarding if dose-response is limited to a certain level of physical activity (16).

4.3 Methodological limitations

The eight primary studies collected data from various sample sizes covering a range of approximately 4000 participants. The studies conducted by Flint et al. (14) and Mytton et al. (15) solely found statistical significant results regarding BMI. This might have been affected by the number of participants, which is apparent when comparing the greater sample size of the previously mentioned studies to Sareban et al. (11) and Schmied et al. (16). They examined a relatively small group of participants and had no statistically significant results. By examining a greater sample size, the results regarding active commuting and body composition are more likely to be generalizable to the population which in this review is adults. Additionally, sample size also effected intervention groups individually. Flint et al. (14) had active commuting and public transport in the same group, which resulted in a majority of the sample size switching from car to public transport instead of active commuting. Since the participants had an opportunity to choose, the results might be underestimated relative to whether the groups were separated.

The results regarding active commuting and its effect on body composition might differ between the studies, partly due to study design. Randomized control trials and cohort studies are both utilized when examining whether an intervention results in an intended outcome. However, randomized control trial is the only study design that with certainty can ascertain if the results arise from the intervention and no other factors. Therefore, the results regarding causation between active commuting and BMI in the study conducted by Sareban et al. (11) and Schmied et al. (16) probably occurred on account of the intervention and not due to other leisure time activities. Conversely, Mytton et al. (15) and Flint et al. (14) are not capable of examining a cause-effect relationship which indicates that outcomes could be affected by activities such as lifting weights, running on the treadmill, or other physical activity. By implementing control groups, randomization is optimized which avoids bias and increases probability of causation. Blond et al. (9) and Møller et al. (10) both found a statistical significant decrease when comparing an intervention group of active commuters to a control group. Concerning the fact that the study is a randomized control trial, it is probable that the reduction in body weight from Blond et al. (9) was in fact due to commuter cycling. In contrast, the results regarding body weight in Peterman et al. (12) might be due to other leisure time exercise activities that are not checked for.

The Country of region might have affected both results and feasibility regarding active commuting and its benefits on body composition. All studies required commuting by either walking, cycling or public transport. In regards, cycling conditions differ on some aspects. The studies by Blond et al. (9) and Møller et al. (10) were both conducted in Denmark which is known for ideal cycling conditions, due to flat terrain and easy access to bicycles. This could contribute to validity and reliability, possibly due to less participants withdrawing from the studies. Conversely, Switzerland is known for uneven terrain and the United Kingdom for precipitation, this might have influenced feasibility in the elected studies compared to the studies conducted in Denmark.

All the elected studies conducted either objective- or self-reported data collection both regarding active commuting and body composition. Sareban et al. (11) and Schmied et al. (16) found a slight decrease in BMI compared to Mytton et al. (15) which found the greatest decrease succeeded by Flint et al. (14). This could be attributed to the utilization of self-reported data in comparison to objective measurements. Several studies gather information on active commuting habits by implementing questionnaires (13–15) which are less reliable than objective measurements such as GPS and distance recorders. By implementing self-reported data, results could be less reliable partly due to participants' ability to under- or overestimate daily activity.

Self-reported data was also implemented regarding body composition (13,15), which increases probability of bias. This may be affected by the ability to remember daily tasks like weighing oneself. For the study to be reliable and to limit sources of error it is recommended to measure body weight at approximately the same time every day. Body weight naturally fluctuates between AM and PM due to water weight and nourishment (21). Considering there was no indication regarding when body weight was measured, the difference between pre- and post measurements may have been incorrectly estimated. In addition, self-reported data provided by participants with active- or healthy commuter habits and obese individuals were prone to underreport their body weight, which possibly had an impact on the estimates (15). Sources of error can typically arise in accordance with self-reported data. This could result in active commuting indicating a greater impact on body composition compared to objective measurements (15). Conversely, participants from the studies conducted by Sareban et al. (11) and Schmied et al. (16) had self-reported data verified by an objective method of measure, possibly resulting in more precise outcomes.

As mentioned above exercise energy expenditure could influence alterations in body composition. Consequently, it is important to assess the limitations from the study conducted by Blond et al. (9) regarding estimation of exercise energy expenditure and intensity. Direct measurements were not utilized during exercise but estimated through heart rate data. As mentioned above this could lead to an over- or underestimation regarding body composition results. Possibly resulting in cycling having the greatest effect on alterations in body composition. In addition, Sareban et al. (11) did not monitor exercise intensity regularly which might result in attenuated outcomes. Conversely, the participants in Peterman et al. (12) knew their activity was being monitored which could have enhanced motivation to ride the pedelecs more in addition to increasing intensity. Due to participants' awareness of monitored activity, validity and reliability of the results might have been affected negatively.

Measurement methods differ substantially between the studies making them challenging to compare. Blond et al. (9) and Møller et al. (10) found the greatest decrease in body fat however they did not utilize the same methods of measurement. Results regarding body fat were presented differently either in kilograms or in millimetres. Making it challenging to assess whether the reduction in body fat was greater in one study compared to the other. Additionally, there is reason to assume that results presented by Blond et al. (9) are more reliable due to DXA scan being the golden standard for body composition. In comparison, the study by Møller et al. (10) utilized callipers as a measurement method regarding body fat which is less reliable, due to possible sources of error regarding human factors.

4.4 Limitations

In conducting this literature review there were some limitations associated with the initial search within the databases, possibly impacting the conclusion. The entirety of articles utilized for this review were not randomized control trials which affects the possibility to examine the cause-effect relation between active commuting and body composition. Solely implementing randomized control trials in this review may have resulted in more reliable conclusions regarding to what extent active commuting could impact alterations in body composition. However, two databases were not able to limit the search to solely include randomized control trials which affected the election of studies. Furthermore, there was a limited selection of studies to choose from examining the effect of active commuting on body composition, resulting in difficulty with drawing uniform conclusions.

5. Conclusion

In conclusion, there is reason to assume that incorporating active commuting among adults can lead to alterations in body composition. Based on some studies incapability to examine causation it is difficult to evaluate if alterations in body composition was due to the intervention or other leisure time activity. After assessing the studies, evidence exhibits that cycling resulted in a greater decrease in body fat, weight and BMI in comparison to walking and public transport. In addition, several studies found that dose-response influenced body composition, nonetheless there are disagreements regarding the amount of activity needed to provoke change. Ultimately, uniform conclusions are complicated to draw due to the limited selection of relevant articles, measurement methods, limitations and differences in study design. To achieve more precise knowledge regarding alterations in body composition, there is a necessity for additional research specifically investigating the effects of active commuting.

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