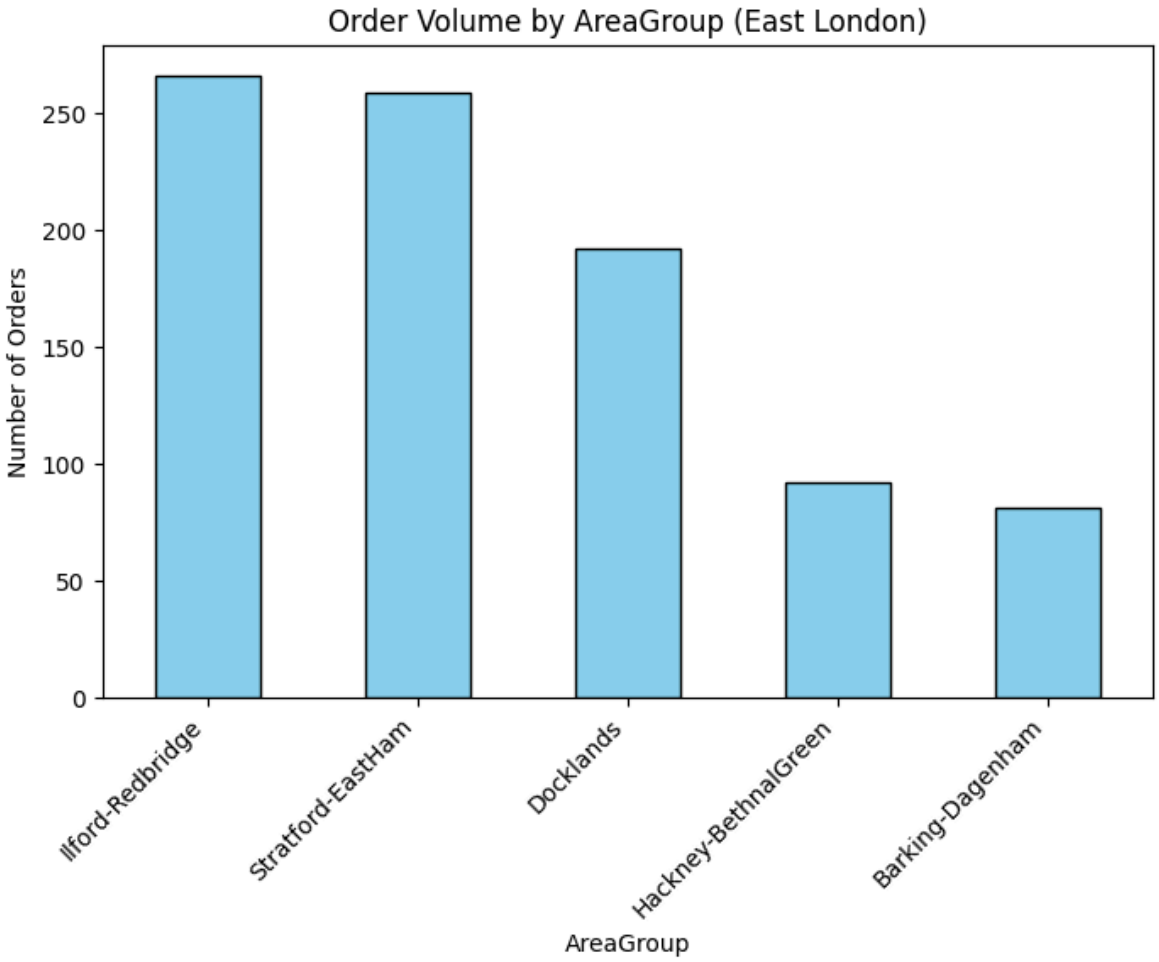
In [9]:
```
import matplotlib.pyplot as plt

area_counts = orders["AreaGroup"].value_counts().sort_values(ascending=False)

plt.figure(figsize=(8,5))
area_counts.plot(kind="bar", color="skyblue", edgecolor="black")
plt.title("Order Volume by AreaGroup (East London)")
plt.ylabel("Number of Orders")
plt.xticks(rotation=45, ha="right")
plt.show()
```

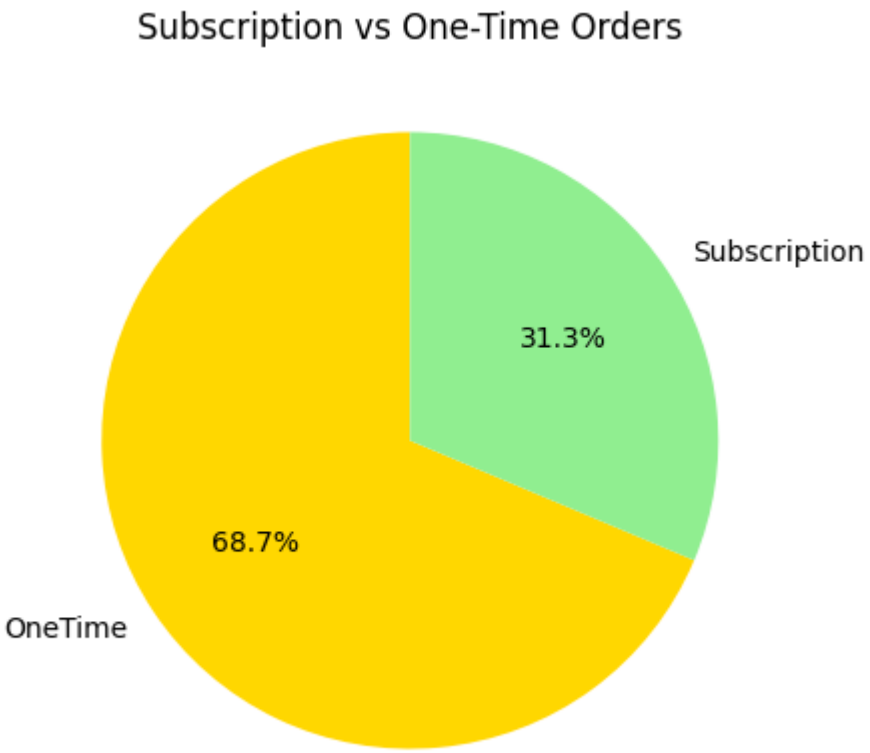


Insight: Orders by AreaGroup

- Stratford-EastHam and Ilford-Redbridge are the strongest demand hotspots.
- Docklands and Hackney-BethnalGreen are secondary but still significant.
- This indicates East London demand clusters around Stratford and Ilford.

In [10]:
```
order_type_counts = orders["OrderType"].value_counts(normalize=True) * 100

plt.figure(figsize=(5,5))
order_type_counts.plot(
    kind="pie",
    autopct="%.1f%%",
    startangle=90,
    colors=["gold","lightgreen"]
)
plt.title("Subscription vs One-Time Orders")
```

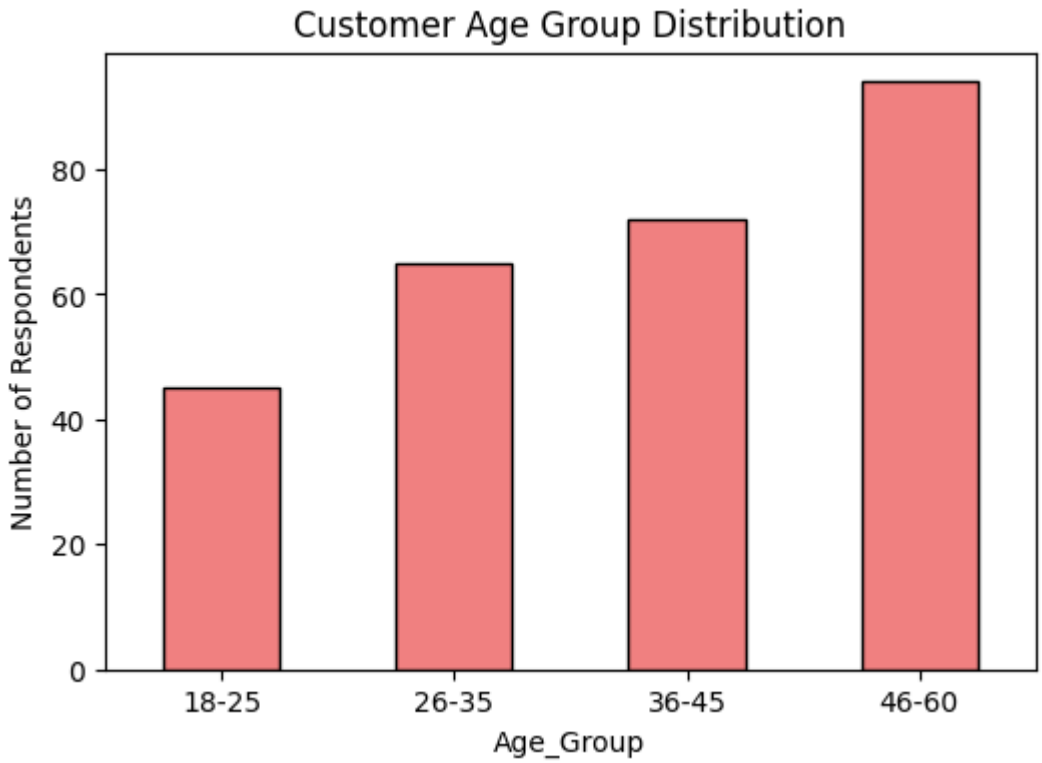
```
plt.ylabel("")
plt.show()
```



Insight: Subscription vs One-Time

- ~70% of orders are one-time platters vs ~30% subscription.
- Customers prefer flexibility, but subscriptions still provide steady revenue.
- Opportunity: target high-loyalty customers with subscription offers.

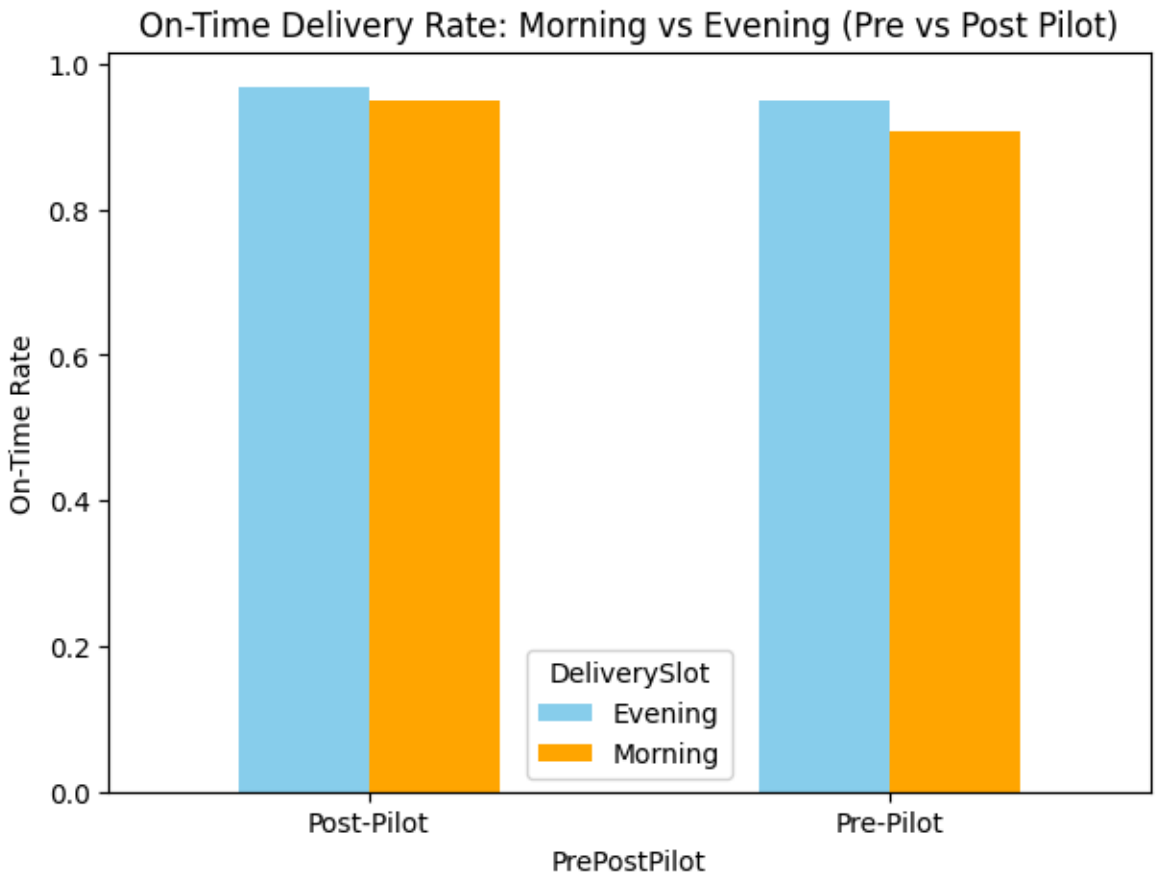
In [5]:
```
age_counts = survey["Age_Group"].value_counts().sort_index()

plt.figure(figsize=(6,4))
age_counts.plot(kind="bar", color="lightcoral", edgecolor="black")
plt.title("Customer Age Group Distribution")
plt.ylabel("Number of Respondents")
plt.xticks(rotation=0)
plt.show()
```



Insight: Age Segments

- Majority of customers fall in 26–35 and 36–45 brackets.
- Younger segment (18–25) shows potential for growth with targeted campaigns.
- Older customers (46–60) form a stable base for subscriptions.

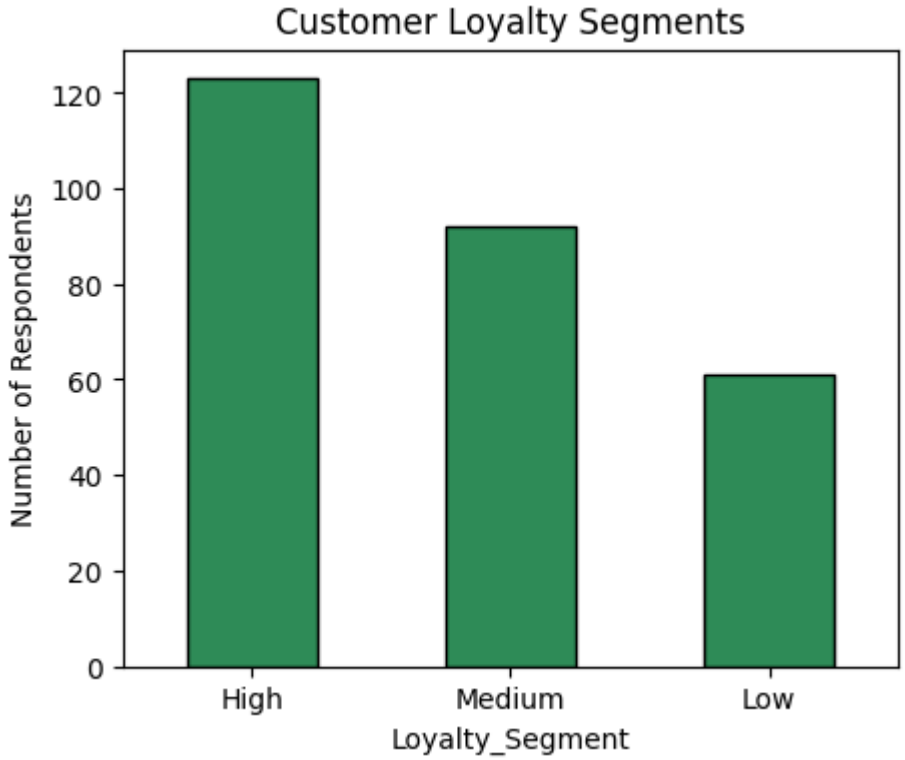
In [11]:
```
pilot_perf = (
    orders.groupby(["PrePostPilot","DeliverySlot"])["IsOnTime"]
    .mean()
    .unstack()
)

pilot_perf.plot(kind="bar", figsize=(7,5), color=["skyblue","orange"])
plt.title("On-Time Delivery Rate: Morning vs Evening (Pre vs Post Pilot)")
plt.ylabel("On-Time Rate")
plt.xticks(rotation=0)
plt.show()
```



Insight: On-Time Delivery (Morning vs Evening Pilot)

- Morning deliveries consistently performed well (~95% on-time).
- Evening deliveries improved significantly after the June 10th pilot.
- Recommendation: scale evening delivery slots to meet demand and capture "evening snack" market.

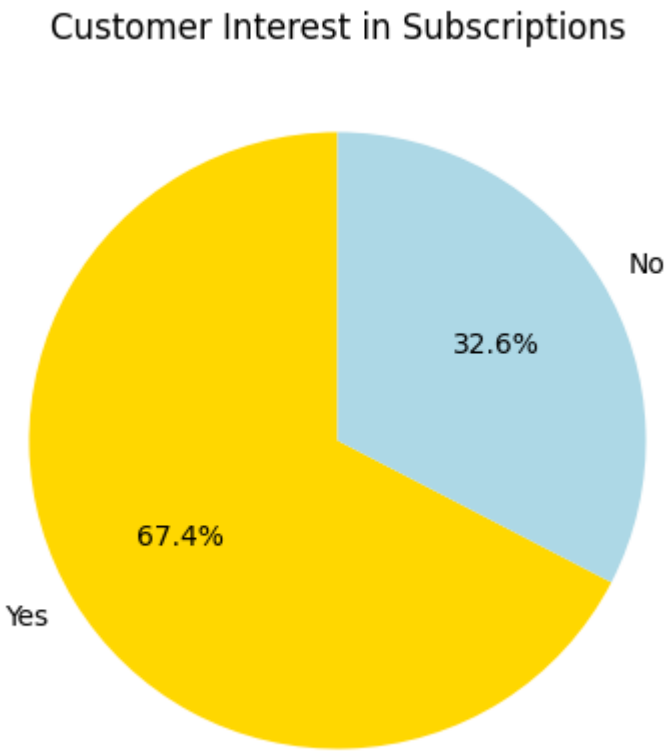
In [12]:
```
loyalty_counts = survey["Loyalty_Segment"].value_counts()

plt.figure(figsize=(5,4))
loyalty_counts.plot(kind="bar", color="seagreen", edgecolor="black")
plt.title("Customer Loyalty Segments")
plt.ylabel("Number of Respondents")
plt.xticks(rotation=0)
plt.show()
```



Insight: Loyalty Segments

- High loyalty (weekly buyers) make up a strong share of the customer base.
- Medium loyalty (bi-weekly) dominate the segment.
- Low loyalty (monthly) still represent a large untapped conversion pool.

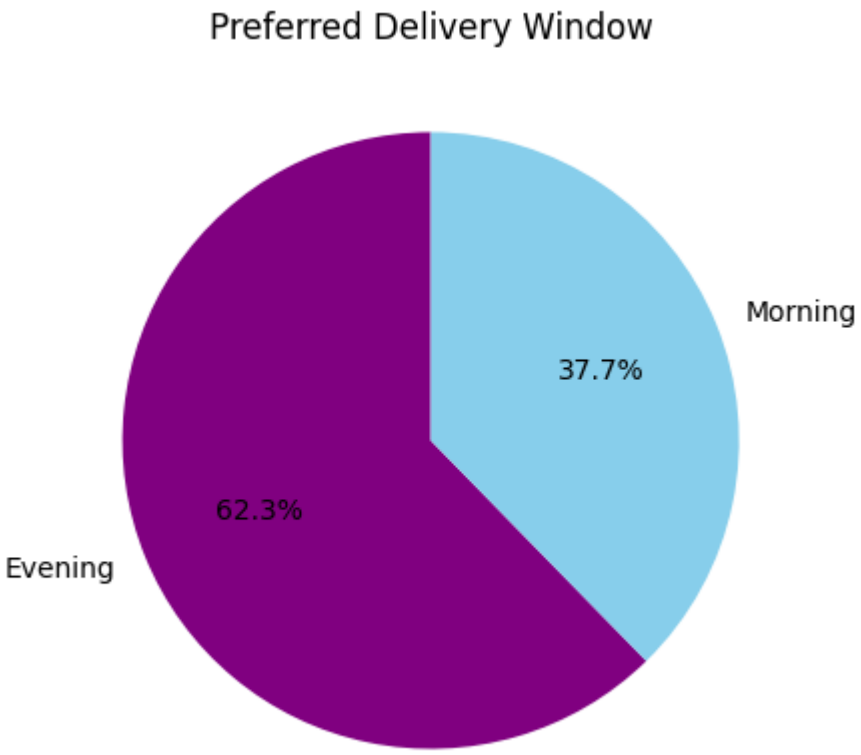
In [6]:
```
sub_interest = survey["Subscription_Interest"].value_counts(normalize=True) * 10

plt.figure(figsize=(5,5))
sub_interest.plot(
    kind="pie",
    autopct="%.1f%%",
    startangle=90,
    colors=["gold","lightblue"]
)
plt.title("Customer Interest in Subscriptions")
plt.ylabel("")
plt.show()
```



Insight: Subscription Interest

- ~30% of customers express interest in subscriptions, consistent with actual orders.
- Strong alignment between survey feedback and sales data.
- Opportunity: push “Essence” and “Elevate” plans for higher-value customers.

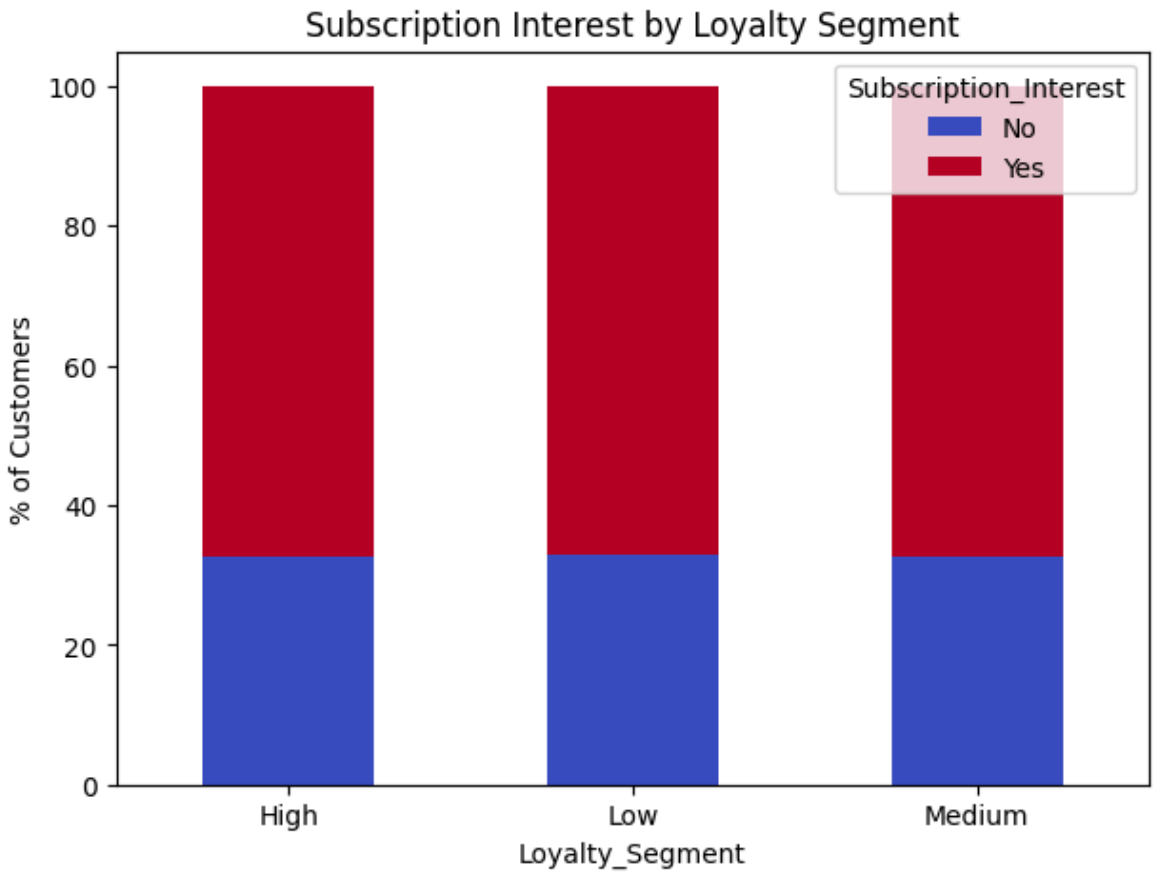
In [7]:
```
delivery_pref = survey["DeliveryWindow_Preference"].value_counts(normalize=True)

plt.figure(figsize=(5,5))
delivery_pref.plot(
    kind="pie",
    autopct="%.1f%%",
    startangle=90,
    colors=["purple","skyblue"]
)
plt.title("Preferred Delivery Window")
plt.ylabel("")
plt.show()
```



Insight: Delivery Preferences

- Customers are nearly evenly split between Morning and Evening preference.
- Evening slot interest validates the operational pilot test.
- Expanding evening deliveries could unlock additional demand.

In [8]:
```
cross_tab = pd.crosstab(survey["Loyalty_Segment"], survey["Subscription_Interest
cross_tab.plot(kind="bar", stacked=True, figsize=(7,5), colormap="coolwarm")

plt.title("Subscription Interest by Loyalty Segment")
plt.ylabel("% of Customers")
plt.xticks(rotation=0)
plt.show()
```



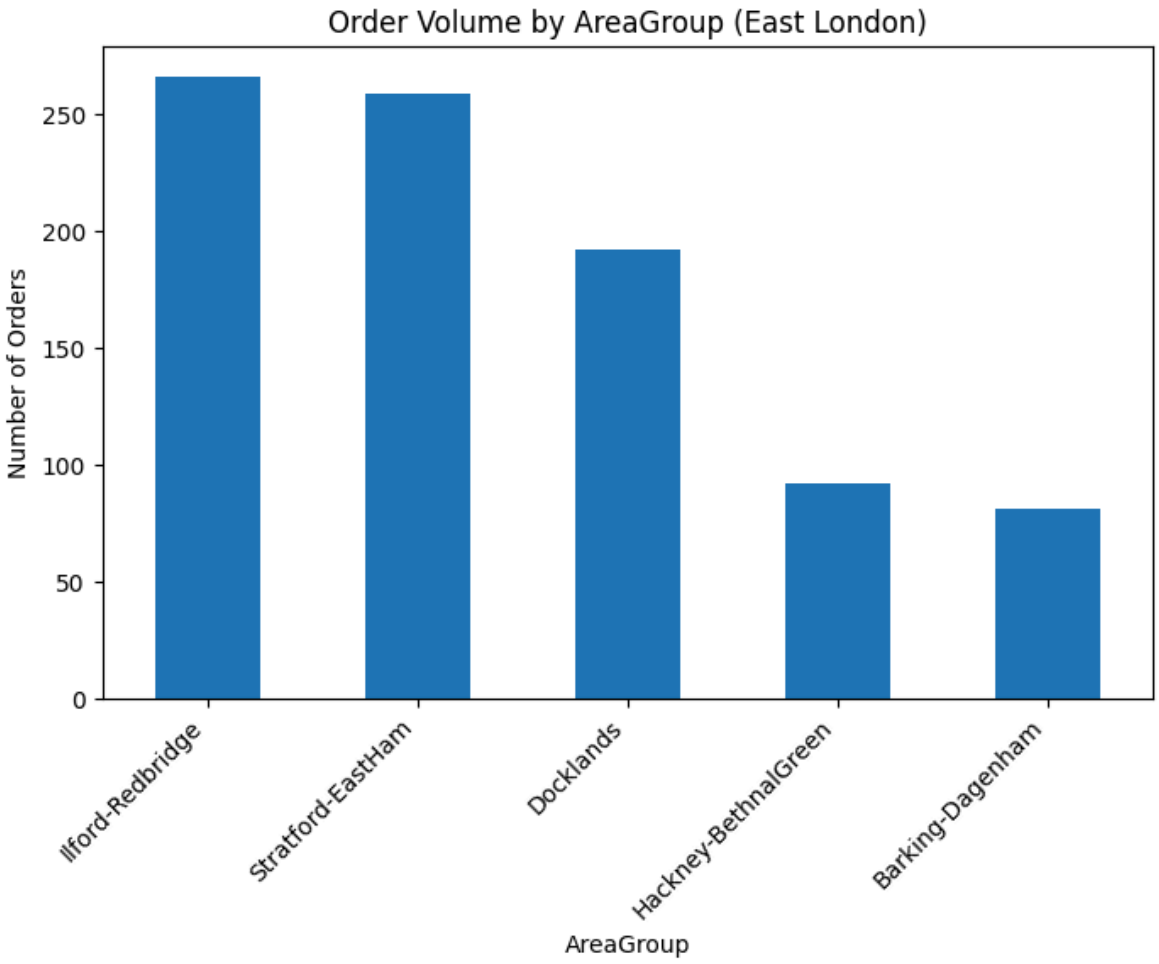
Insight: Loyalty vs Subscription Interest

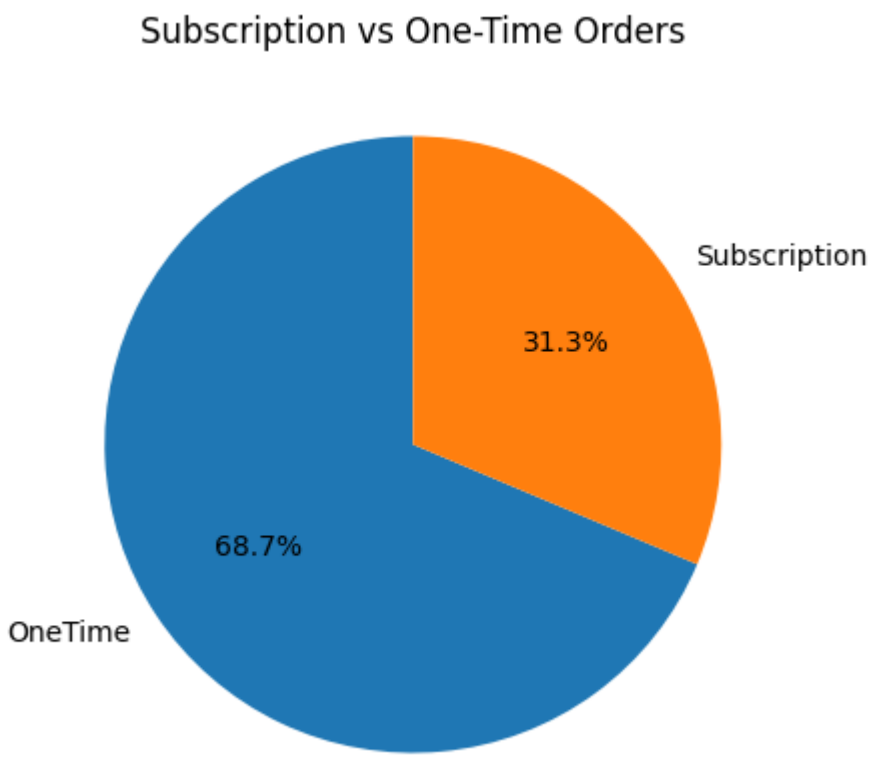
- High-loyalty customers (weekly buyers) are most likely to consider subscriptions.
- Medium-loyalty customers split between one-time and subscription interest.
- Low-loyalty customers are least interested in subscriptions, so focus efforts on upselling medium/high groups.

In [4]:
```
# Rebuild all charts in one go

import pandas as pd
import matplotlib.pyplot as plt

# Ensure plotting displays in the notebook
# (safe if you run it in classic Jupyter; ignored in JupyterLab)
%matplotlib inline

# ---- Load processed data (adjust paths if needed) ----
orders = pd.read_csv("../data/processed/orders_clean.csv")
survey = pd.read_csv("../data/processed/survey_clean.csv")

# 1) Orders by AreaGroup
area_counts = orders["AreaGroup"].value_counts().sort_values(ascending=False)
plt.figure(figsize=(8,5))
area_counts.plot(kind="bar")
plt.title("Order Volume by AreaGroup (East London)")
plt.ylabel("Number of Orders")
plt.xticks(rotation=45, ha="right")
plt.show()

# 2) Subscription vs One-Time split
```

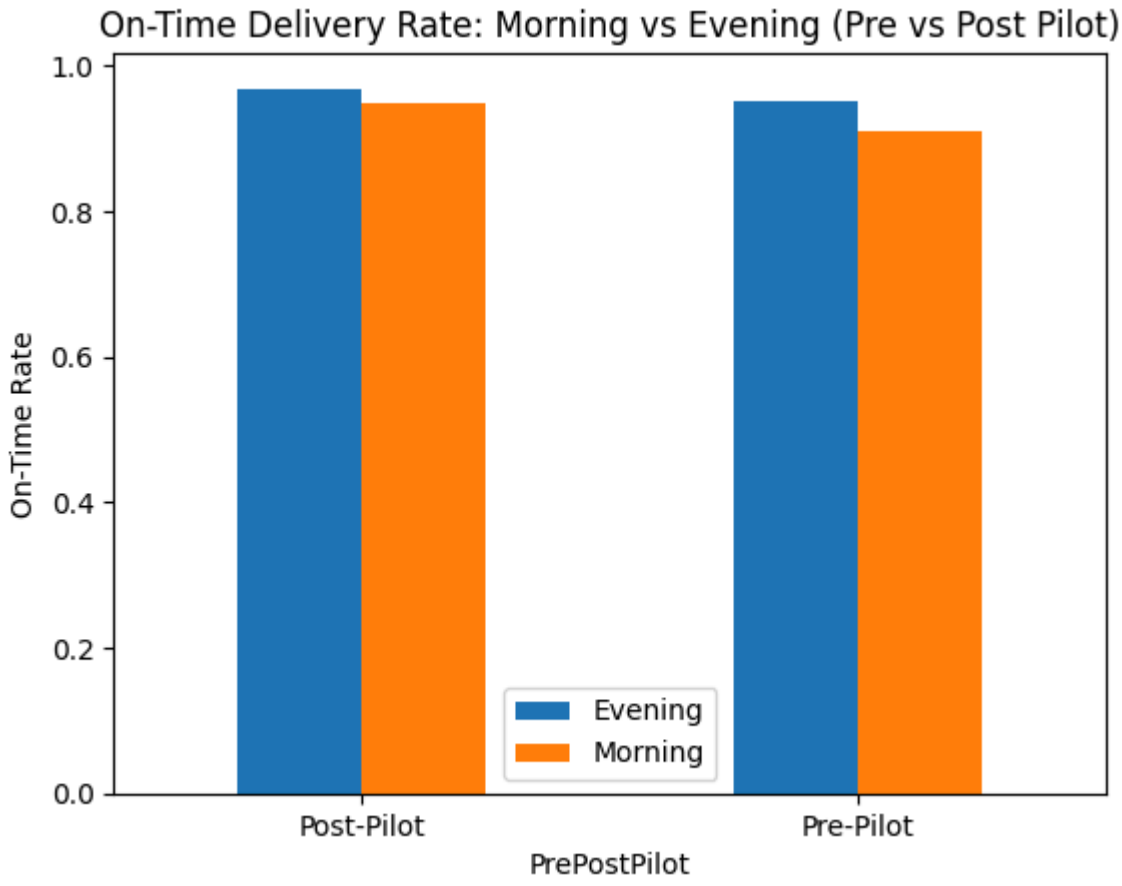
```
order_type_counts = orders["OrderType"].value_counts(normalize=True) * 100
plt.figure(figsize=(5,5))
order_type_counts.plot(kind="pie", autopct="%.1f%%", startangle=90)
plt.title("Subscription vs One-Time Orders")
plt.ylabel("")
plt.show()

# 3) On-Time Delivery (Morning vs Evening, Pre vs Post Pilot)
pilot_perf = (
    orders.groupby(["PrePostPilot","DeliverySlot"])["IsOnTime"]
    .mean()
    .unstack()
)
plt.figure(figsize=(7,5))
pilot_perf.plot(kind="bar")
plt.title("On-Time Delivery Rate: Morning vs Evening (Pre vs Post Pilot)")
plt.ylabel("On-Time Rate")
plt.xticks(rotation=0)
plt.legend(title="")
plt.show()

# 4) Age Group distribution
age_counts = survey["Age_Group"].value_counts().sort_index()
plt.figure(figsize=(6,4))
age_counts.plot(kind="bar")
plt.title("Customer Age Group Distribution")
plt.ylabel("Number of Respondents")
plt.xticks(rotation=0)
plt.show()

# 5) Loyalty Segments
loyalty_counts = survey["Loyalty_Segment"].value_counts()
plt.figure(figsize=(5,4))
loyalty_counts.plot(kind="bar")
plt.title("Customer Loyalty Segments")
plt.ylabel("Number of Respondents")
plt.xticks(rotation=0)
plt.tight_layout()
plt.show()


# 6) Subscription Interest (Yes/No)
sub_interest = survey["Subscription_Interest"].value_counts(normalize=True) * 10
plt.figure(figsize=(5,5))
sub_interest.plot(kind="pie", autopct="%.1f%%", startangle=90)
plt.title("Customer Interest in Subscriptions")
plt.ylabel("")
plt.tight_layout()
plt.show()


# 7) Preferred Delivery Window
delivery_pref = survey["DeliveryWindow_Preference"].value_counts(normalize=True)
plt.figure(figsize=(5,5))
delivery_pref.plot(kind="pie", autopct="%.1f%%", startangle=90)
plt.title("Preferred Delivery Window")
plt.ylabel("")
plt.show()

# 8) Loyalty vs Subscription Interest (stacked)
```

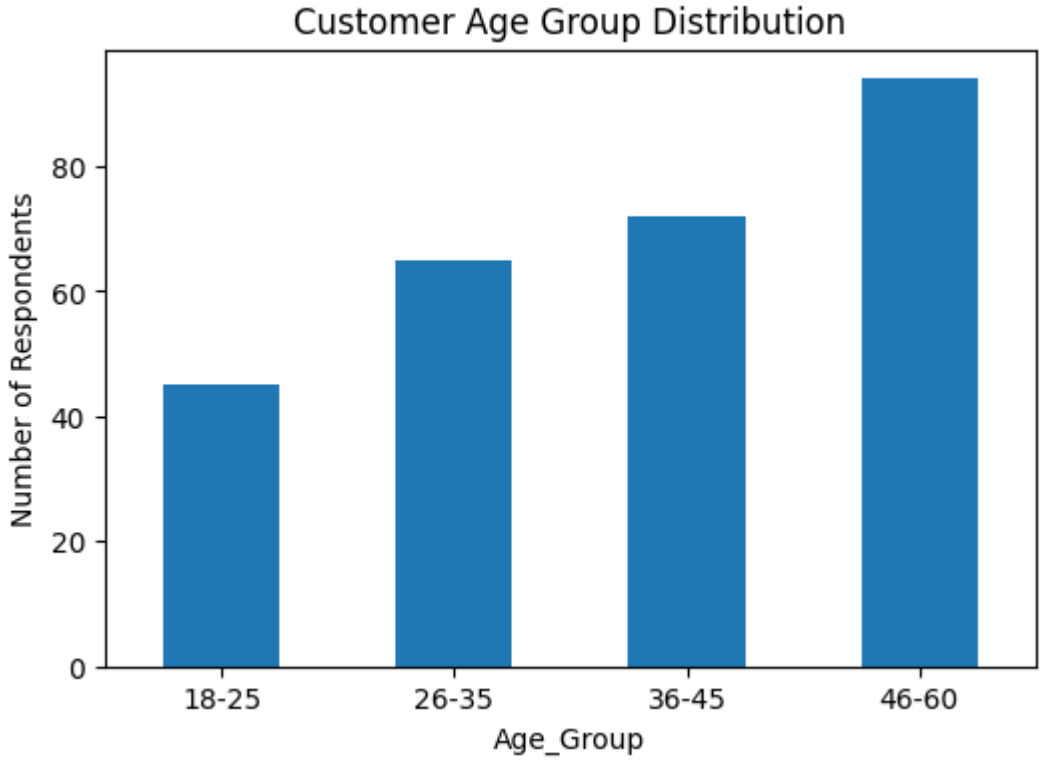
```
cross_tab = pd.crosstab(
    survey["Loyalty_Segment"],
    survey["Subscription_Interest"],
    normalize="index"
) * 100
plt.figure(figsize=(7,5))
cross_tab.plot(kind="bar", stacked=True)
plt.title("Subscription Interest by Loyalty Segment")
plt.ylabel("% of Customers")
plt.xticks(rotation=0)
plt.legend(title="", bbox_to_anchor=(1.05, 1), loc="upper left")
plt.tight_layout()
plt.show()
```

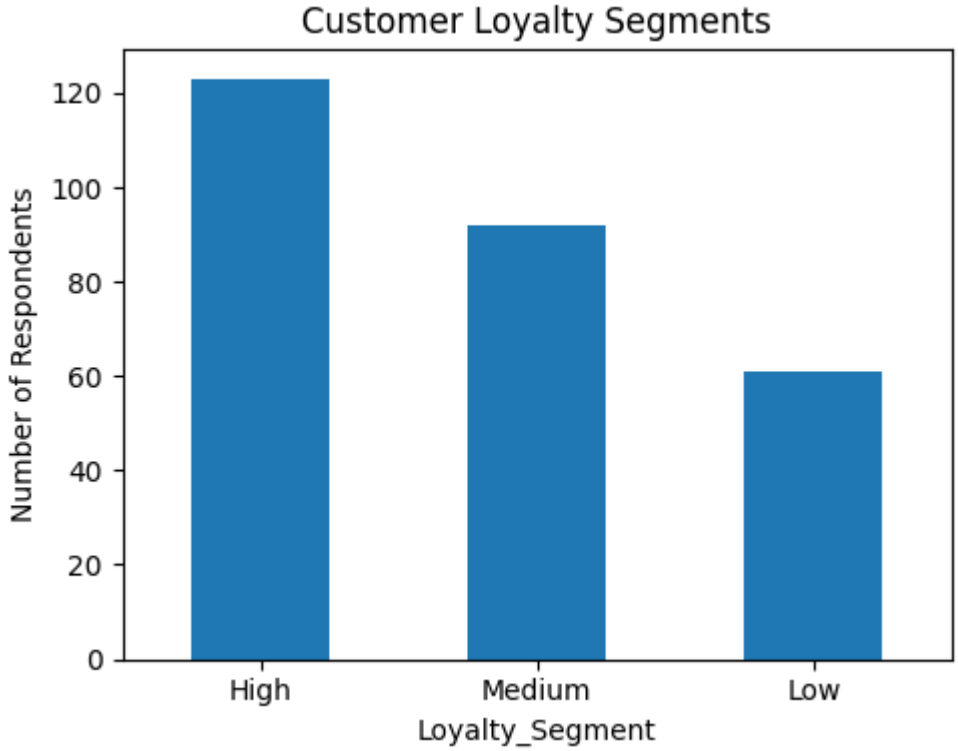


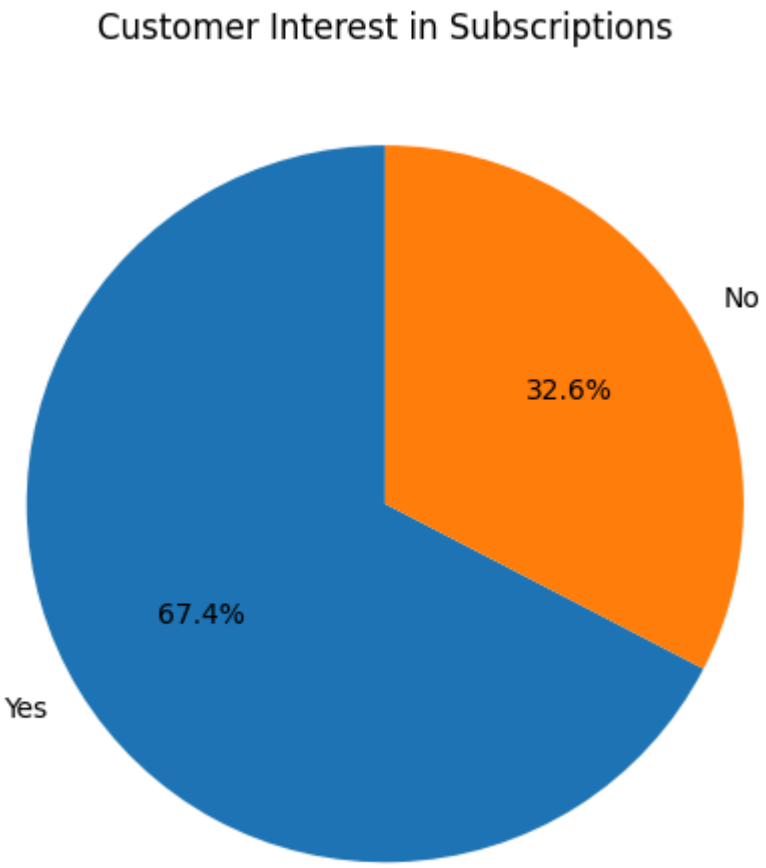


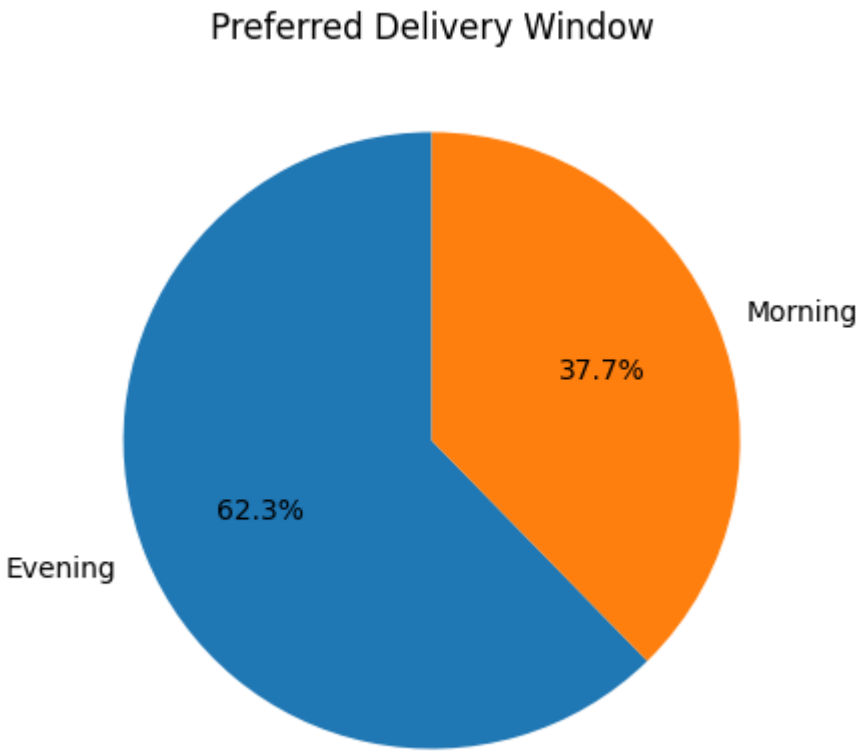

```
<Figure size 700x500 with 0 Axes>
```



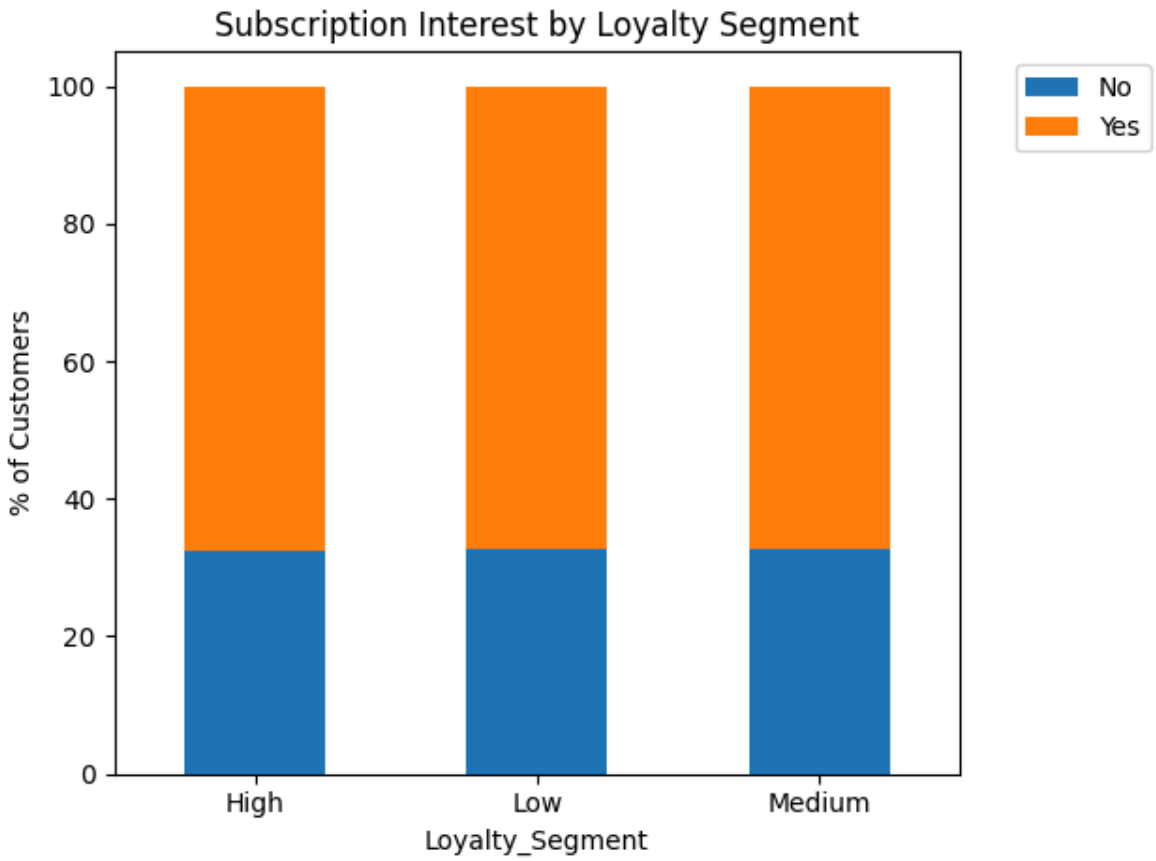

Customer Age Group Distribution
Number of Respondents
0
20
40
60
80
18-25
26-35
36-45
46-60
Age_Group


Customer Loyalty Segments
Number of Respondents
0
20
40
60
80
100
120
High
Medium
Low
Loyalty_Segment






```
<Figure size 700x500 with 0 Axes>
```



Insight: Orders by AreaGroup

- Stratford-EastHam and Ilford-Redbridge drive the majority of orders.
- Docklands and Hackney-BethnalGreen are secondary hotspots.
- Focused marketing in Stratford and Ilford could maximize growth in East London.

Insight: Age Segments

- Majority of customers fall in 26–35 and 36–45 brackets.
- Younger segment (18–25) shows potential for growth with targeted campaigns.
- Older customers (46–60) form a stable base for subscriptions.